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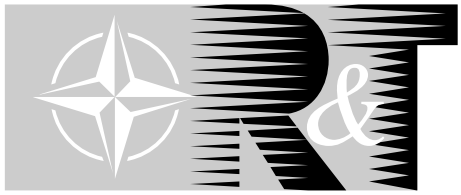
NORTH ATLANTIC TREATY ORGANIZATION



RESEARCH AND TECHNOLOGY ORGANIZATION

BP 25, 7 RUE ANCELLE, F-92201 NEUILLY-SUR-SEINE CEDEX, FRANCE

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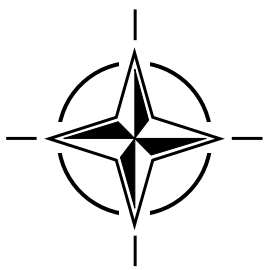
RTO MEETING PROCEEDINGS 68

The Impact of NATO/Multinational Military Missions on Health Care Management

(l'Impact des missions OTAN/militaires internationales sur la gestion des soins de santé)

Papers presented at the RTO Human Factors and Medicine Panel (HFM) Specialists' Meeting held in Kiev, Ukraine, 4-6 September 2000.



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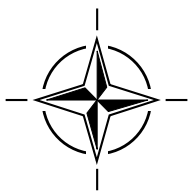

The Research and Technology Organization (RTO) of NATO

RTO is the single focus in NATO for Defence Research and Technology activities. Its mission is to conduct and promote cooperative research and information exchange. The objective is to support the development and effective use of national defence research and technology and to meet the military needs of the Alliance, to maintain a technological lead, and to provide advice to NATO and national decision makers. The RTO performs its mission with the support of an extensive network of national experts. It also ensures effective coordination with other NATO bodies involved in R&T activities.

RTO reports both to the Military Committee of NATO and to the Conference of National Armament Directors. It comprises a Research and Technology Board (RTB) as the highest level of national representation and the Research and Technology Agency (RTA), a dedicated staff with its headquarters in Neuilly, near Paris, France. In order to facilitate contacts with the military users and other NATO activities, a small part of the RTA staff is located in NATO Headquarters in Brussels. The Brussels staff also coordinates RTO's cooperation with nations in Middle and Eastern Europe, to which RTO attaches particular importance especially as working together in the field of research is one of the more promising areas of initial cooperation.

The total spectrum of R&T activities is covered by the following 7 bodies:

- AVT Applied Vehicle Technology Panel
- HFM Human Factors and Medicine Panel
- IST Information Systems Technology Panel
- NMSG NATO Modelling and Simulation Group
- SAS Studies, Analysis and Simulation Panel
- SCI Systems Concepts and Integration Panel
- SET Sensors and Electronics Technology Panel

These bodies are made up of national representatives as well as generally recognised 'world class' scientists. They also provide a communication link to military users and other NATO bodies. RTO's scientific and technological work is carried out by Technical Teams, created for specific activities and with a specific duration. Such Technical Teams can organise workshops, symposia, field trials, lecture series and training courses. An important function of these Technical Teams is to ensure the continuity of the expert networks.

RTO builds upon earlier cooperation in defence research and technology as set-up under the Advisory Group for Aerospace Research and Development (AGARD) and the Defence Research Group (DRG). AGARD and the DRG share common roots in that they were both established at the initiative of Dr Theodore von Kármán, a leading aerospace scientist, who early on recognised the importance of scientific support for the Allied Armed Forces. RTO is capitalising on these common roots in order to provide the Alliance and the NATO nations with a strong scientific and technological basis that will guarantee a solid base for the future.

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The Impact of NATO/Multinational Military Missions on Health Care Management

(RTO MP-068 / HFM-051)

Executive Summary

The Human Factor and Medicine Panel (HFM) of the NATO Research and Technology Organization (RTO) held a Specialists' Meeting entitled "The Impact of NATO/Multinational Military Missions on Health Care Management" at the "Ukrainsky Dim" in Kiev, Ukraine, 4-6 September 2000.

The Meeting addressed the planning, policy, organization and management of armed forces medical support while they perform various missions at national, allied or joint levels. Participants discussed a wide range of issues: military personnel health monitoring and protection during the pre-deployment, deployment and post-deployment phases, military-medical standardization, combat trauma, diseases and non-battle injuries (DNBI), new concepts of medical evacuation, civil-military interaction in medical support, training of military-medical personnel, and research.

The Meeting discussed a number of topics that will benefit the military, including: principles of organization based on a single military medical doctrine, joint training, standardization, preventive medicine, command, control, communication, and computers, interaction of military medical staffs, psychological aspects of joint actions of multinational troops, Health Service Support (HSS) and medical evacuation of the sick and wounded during large-scale multinational military exercises, telemedicine in its application to multinational HSS, and interoperability in medical support.

The Meeting provided applicable recommendations with regard to the improvement of armed forces medical support, the extension of NATO and PfP military-medical interactions, as well as civil-military health care integration. The Meeting outlined prospective areas and directions for the further research, discussion and development:

1. It should be considered to establish a HFM Task Group for a review and comparative analysis of NATO and non-NATO (Ukraine, Russian) versions of Military Medical Doctrines, and for an evaluation of the experiences of all parties in medical support activities.
2. NATO standardisation activity might be extended to PfP countries through a joint evaluation of standards in medical care and in military-medical terminology.
3. Leading research institutes and military medical centers of NATO and PfP countries might be invited to submit proposals for military medical research co-operation in the areas mentioned above, and to develop selected joint international research programs based on these proposals.
4. Military medical personnel of PfP countries should participate more frequently in short and long-term training courses in NATO countries.
5. Possibilities should be explored of carrying out a joint NATO/PfP field exercise in Ukraine in order to evaluate the interaction of multinational military-medical services during peacekeeping missions.

l'Impact des missions OTAN/militaires internationales sur la gestion des soins de santé

(RTO MP-068 / HFM-051)

Synthèse

La commission sur les facteurs humains et la médecine (HFM) de l'Organisation pour la recherche et la technologie (RTO), a organisé une réunion de spécialistes sur « L'impact des missions OTAN/militaires internationales sur la gestion des soins de santé » au « Ukrainsky Dim » à Kiev, en Ukraine du 4 au 6 septembre 2000.

La réunion a eu pour objectif d'examiner la planification, la politique, l'organisation et la gestion du soutien médical assuré par les forces armées au cours de différentes missions exécutées au niveau national, allié ou interarmées. Les participants ont discuté d'un grand éventail de sujets : le contrôle et de la protection de la santé des personnels militaires pendant les phases de pré-déploiement, de déploiement et de post-déploiement, la normalisation médicale militaire, les traumatismes de combat et les malades et blessés hors combat (DNBI), les nouvelles perspectives pour l'évacuation sanitaire, l'interaction civil-militaire dans le soutien médical, l'entraînement du personnel médical militaire et la recherche.

L'atelier a examiné un certain nombre de sujets susceptibles d'intéresser les militaires, dont : les principes organisationnels, basés sur une doctrine médicale militaire unique; la formation interarmées, la standardisation; la médecine préventive; le commandement, contrôle et communications; l'informatique; les interactions entre les personnels médicaux militaires internationaux; les aspects psychologiques des actions interarmées faisant appel à des troupes multinationales; le support fourni par les services de santé (HSS) et l'évacuation sanitaire des malades et des blessés lors d'exercices militaires en vraie grandeur impliquant des troupes multinationales; le soutien médical d'exercices militaires multinationaux interarmées à grande échelle; la télémédecine dans toutes ses applications lors d'un HSS multinational, ainsi que l'interopérabilité du soutien médical.

La réunion a débouché sur des recommandations applicables dans les domaines du soutien médical des forces armées, du prolongement des interactions OTAN/PpP et de l'intégration des soins de santé médicaux militaires. La réunion a indiqué les principaux axes et les domaines prometteurs de recherche, de discussions et de développement, à savoir:

1. Il y a lieu de prendre en considération la création d'un groupe de travail HFM qui effectuerait un examen et une analyse comparative des versions OTAN et non-OTAN (Ukraine, Russie) des doctrines militaires médicales, ainsi qu'une évaluation de l'expérience de l'ensemble des participants dans le domaine des activités de soutien médical.
2. Les activités de normalisation de l'OTAN pourraient être étendues aux pays du PpP par le biais d'une évaluation conjointe des normes en matière de soins médicaux et de terminologie médicale militaire.
3. Les instituts de recherche et les centres médicaux militaires de premier rang de l'OTAN et des pays du PpP pourraient être invités à soumettre des propositions concernant la recherche médicale militaire en coopération dans les domaines précités, et à élaborer des programmes de recherche conjoints internationaux particuliers, sur la base de ces propositions.
4. Le personnel médical militaire des pays du PpP devrait participer plus activement aux stages de formation à court et à long terme organisés par les pays de l'OTAN.
5. Il y a lieu d'examiner la possibilité d'organiser un exercice sur le terrain conjoint OTAN/PpP en Ukraine afin d'évaluer l'interaction des services médicaux militaires internationaux lors des missions de maintien de la paix.

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Technical Evaluation Report

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TITLE, DATE AND PLACE OF MEETING

The Specialists' Meeting on "The impact of NATO/multinational military missions on health care management" organized by the Human Factors and Medicine Panel, was held in Kiev, Ukraine 4-6 September 2000.

INTRODUCTION

On 4-6 September 2000, NATO and Partner nations from 10 countries met in Kiev to discuss the planning, policy, organization and management of medical support of armed forces while they perform various missions on national level, within the frame of NATO or NATO plus PfP nations. Sponsored by the Human Factors and Medicine Panel of the North Atlantic Treaty Organization's Research and Technology Organization, the Meeting participants discussed a range of relevant topic, including military personnel health monitoring and protection during thepre-deployment, deployment and post-deployment phases, military-medical standardization, combat trauma and diseases and non-battle trauma (DNBI), new perspectives on the medical evacuation, civil-military interaction in medical support, training of military-medical personnel, and research. The meeting audience included experts from NATO countries as well as from invited nations. Twenty-one papers, including two key-note reports were presented from the USA, GE, CZ, IMS, SHAPE, Ukraine, and Russia.

THEME / OVERVIEW

The new NATO Force Structure stresses multinationality, flexibility and rapid deployment of multinational forces to any area for any type of mission. Medical support concepts and specialized medical equipment are different in the various nations, depending on many circumstances, such as geographical conditions, the nations' ability to finance health support systems, the state of the art in a given country and its level of technological development, etc. However, a coherent medical structure tailored to the anticipated employment is required and medical units should be as strategically and tactically mobile as the force they support. Each nation has ultimate responsibility for ensuring the provision of medical resources for the support of its forces, though increasingly this responsibility is being met through medical force sharing or co-operation, i.e. multinationally. NATO doctrine now fully supports the concept of multinational medical support.

Health support plays a key role in joint military operations. This implies that individual and team capabilities need to be improved, that the logistical strain for world-wide military operations needs to be reduced, and that mission-effective operational, preventive, and flight medicine needs to be available. In multinational scenarios, these are the key factors to ensure maintenance of health and the prevention of disease, treatment and evacuation of sick and wounded, and re-supply of medical material.

PURPOSE AND SCOPE OF THE MEETING

The purpose of this Specialists' Meeting was to: exchange information and experience on Health Service Support (HSS) of multinational troops, review the development of interoperable forms of multinational HSS in the field, examine the lessons learned during actual operational deployment of multinational medical facilities, and discuss the interplay between multinational, alliance/NGO, and civil/military operations in coping with disasters which require alliance or EAPC assistance. The following topics were addressed: principles of organization based on a single military medical doctrine, terminology and joint training (standardization), preventive medicine, command, control, communication, and computers,

interaction of international military medical staff, psychological aspects of joint actions using multinational troops, HSS and medical evacuation of sick and wounded during fielded military exercises involving multinational troops, medical support of joint large-scale multinational military exercises, telemedicine in its application to multinational HSS, and interoperability in medical support.

MEETING PROGRAM

The Specialists' Meeting's sessions were chaired by Col. Dr. Erich Rödig, Chief of the Department of Aviation Military and Occupational Medicine, Germany Air Force and Prof. Alexander A. Sokhin, M.D., Ph.D., Deputy Director Research Institute of Military Medicine of Ukraine Armed Forces.

The Meeting was opened by LTG Vladymyr Bily, Chief of the Main Military Medical Directorate of Ukraine Ministry of Defense, the Surgeon General of Ukraine Armed Forces. Speakers and participants were also welcomed by Dr Cornelis Wientjes, the Executive of the Human Factors and Medicine Panel of RTA, and Col Vasily Varus, Director of the Research Institute of Military Medicine (RIMM) of the Ukraine Armed Forces, who also acted as Local Coordinator. Finally, Col Dr. E. Roedig presented a brief introduction to the Specialists Meeting. The Opening Session concluded with a Keynote Report titled "Medical support of Ukraine Armed Forces: new vision of organisational structure and management" by LTG Vladymyr Bily (Ukraine).

The papers were arranged according to the five topics in the five Sessions as follows:
Session I: Planning and concept of armed forces medical support.
Session II: Health service support management at various missions of armed forces.
Session III: Special aspects of troops health service support.
Session IV: Medical supply and technologies.
Session V: Principles and policy of medical evacuation.

Technical evaluation

Key-note report (paper #1)

In his keynote address (paper #1), LTG M.C. Bily gave a comprehensive overview of the Ukraine concept of the development of a new military-medical service system, capable to provide modern standards of medical care quality. The essence of the concept is to establish a military-medical service which will consist of three managerial infrastructures (Curative-Pprophylactic, Hhygiene-Eepidemiological, and Military-Medical Supply) and two systems – Training of military-medical personnel and Research. All components will be organically interconnected and will function as a single structure. Presently, the Hygiene-Epidemiological Service of the Ministry of Defense is organized on territorial principles, with a variety of facilities ranging from local laboratories to the central Hygiene-Epidemiological Department. The Preventive Medicine Service is no longer under the direct control of military commanders and medical chiefs, which allows it to carry out independent surveillance and take effective measures. As a result of this reorganization, the epidemiological situation in the Ukraine Armed Forces has much improved. The proposed managerial infrastructure of the Military-Medical Supply Service includes the Main Office of Logistics, central medical stores, regional medical stores, territorial medical stores, pharmacies of base and garrison hospitals and other treatment facilities. It has been proposed that this structure should be entirely submitted to the Main Military Medical Directorate. A new Curative-Prophylactic managerial vertical is now under development. Its essence is the creation of a medical care and treatment system which is based on territorial principles, with the following medical facilities: (1) the Main Military Clinical Hospital, which provides highly specialized care, (2) the Central Military Hospital, which offers specialized medical care, (3) the base Military Hospitals, which provide specialized and qualified medical care, and (4) the Garrison Hospitals, which offer qualified primary care.

LTG Bily emphasized that the proposed managerial infrastructure will allow the Main Military-Medical Directorate to carry out independent planning, personnel selection, as well as financial and supply policies, and to eliminate inter-service barriers by the organization of the medical support system on territorial principles. It will also enable to revive the medical service at the military unit level, where up to 70 % of all disease and trauma cases should be prevented and treated. Military-Medical Education and Research are subordinated to these managerial structures. They work in close cooperation, which allows for

a rational use of the limited resources. In addition, integrative ties have been set up between the Ministry of Defense research, training and treatment establishments and corresponding institutions of the Ministry of Health and the Academy of Medical Sciences.

LTG Bily said that he believes that international cooperation can play an important role in the realization of the military-medical reform in Ukraine and outlined its priorities (rational use of health resources, new medical technologies, military-medical standardization, military-medical doctrine, protection against biological threat, etc.). Furthermore, he noted that setting up a viable nation-wide occupational health care system for military personnel is a complex problem in the Ukraine, and that its realization is one of the crucial criteria for the success of the whole program of construction and development of the Ukraine Armed Forces.

Finally, LTG Bily stated that due to the increasing role of the armed forces in multinational missions, the need for information, experience and expert exchange between national military-medical departments, as well as between research, education and treatment institutions, has dramatically increased.

Key-note report (paper #3)

MG Walter Jertz, Commander of the First German Air Division, presented in his keynote address (paper #3) an overview on "Flexibility is the key to airpower, medical power is the key to operations success: lessons learned from flying operations over the Balkans". His report provides an excellent analysis of the military commanders' responsibility in combat operations, based on extensive operational experience. On the one hand it calls for well equipped smart weapon systems on a high maintenance level, and on the other, it strongly emphasizes the need for well-trained, stress-resistant and healthy crews able and capable to deal with all types of challenges during various phases of military operations. The issue that was addressed by the author is how to ensure that the warfighter can be brought into the condition in which he / she is able to cope with the demands and challenges of combat operations and to perform with the sufficient level / probability of success and survivability in complex hostile environments. During the first, or preparatory (training) phase, the essential physical and psychological pillars will need to be established. It is vitally important for all military personnel and commanders to have well trained medical personnel and up-to-date equipment available to conduct reliable medical checkups and to provide sound medical treatment to attain and maintain physical fitness and health. The warfighter needs to have sufficient confidence that all operations are and will be conducted in accordance with the moral and ethic principles of the UN charter and that he /she will be supported by the government and the public. The psychological pillar is very complex and demanding in its structure and content. At this point it is quite important to comprehend the various influences that form the basis for mission success or mission failure.

Maintaining a high level of physical fitness during combat operations and during individual missions is the most demanding challenge to medical health care management. This is especially important for aircrews because they are exposed to extraordinary high levels of physical and mental load for hours. That is why, in addition to the best available combat equipment, sufficient leisure time needs to be available for physical recreation, in combination with a variety of opportunities for exercise, as well as medication and balanced nutrition.

The tremendous stress load on aircrew encountered in combat mission does not only have a physical but also a mental dimension. Thus, any increase of mental stress has to be avoided or at least reduced to the absolute minimum. After completion of the combat operations, serious consideration has to be given to measures that will promote the physical and psychological recovery of aircrews / warfighters. Besides measures to treat somatic pathology, it is extremely necessary to provide psychological support for servicemen suffering from post traumatic stress syndrome or combat fatigue. The Yugoslavian experience shows that trustful psychological care provided to warfighters and their families is of high value for morale and consequently for combat readiness, and that it is an indispensable complement to physical health care.

MG Jertz concluded his paper by expressing his deep conviction that only after implementation of the full complex of medical measures, we will have a realistic chance to get a warfighter who is not only able to meet the modern technical challenges, but who is also capable to carry out his / her mission with a high likelihood of success and survivability. He concluded his presentation with the statment that medical power becomes or already is the key to operations success.

The principal issues addressed in both key-note reports are: (1) an effective organization and management of medical support is crucial for the success of military missions; (2) in addition to military-medical personnel and leaders, commanders at all levels are key figures in preserving the health and life of servicemen; (3) military medical support should be organized as an independent service with its own managerial verticals, supplementary structures, finance and staffing policy; (4) at times of war or during crises, the military medical service system becomes part of the operational forces with special tasks, to be carried out in accordance with the combat and environmental circumstances.

Planning and concept of armed forces medical support (Session I)

The main goal of the medical support of the Armed Forces is to contribute to the success of military mission through the conservation of manpower, the preservation of life and a minimization of residual physical and mental disabilities. Appropriate medical support makes a major contribution to both force protection and morale by the prevention of disease, rapid evacuation and treatment of the sick, wounded and injured and rapid return to duty of as many individuals as possible. In order to accomplish this mission, a spectrum of medical services is required, ranging from preventive measures through first aid, to resuscitation and stabilization of vital functions, to evacuation and to definitive treatment and rehabilitation. The concept of the armed forces medical support is based on a multiservice military-medical doctrine, which includes the principles and policy of planning, organization and management of different types of health care, preventive medicine, medical supply, as well as NCB protection during military missions in peacetime, crisis or conflict.

The papers presented in Session I discussed a strategic view on the NATO medical support to Crisis Response Operations (CRO), lessons learned from NATO contingency missions, and the need for a rational distribution and use of the available military-medical resources. The following aspects were discussed: the relationship between the ‘medical’ and the ‘logistical’ bodies in NATO; medical representation in the HQ architecture, responsibilities and medical C2 structure in a joint environment, as well as medical support principles and policies.

It was outlined by BG Dr. Klein (ACE Medical Advisor, SHAPE), and his deputy, LTC Dr. Kasper (paper #2) that the provision of medical support is a command responsibility performed by the medical services. On behalf of the commander, the medical service contributes to the achievement of the mission by conserving manpower. Since the main activity of medical and health support is humanitarian in nature, medical units are precious assets, which can be used as well for CRO. Humanitarian medical relief can make a positive psychological impact on public opinion at home, as well as in the disaster area itself. On the other hand, lack of medical support can significantly reduce the soldier's morale and will to fight. BG Dr. Klein outlined the roles and tasks of the medical service, which include preventive measures, medical evacuation, treatment, medical care and hospitalization, medical logistics and research and development. A significant part of BG Dr. Klein’s paper was devoted to medical support principles and policies for multinational medical operations. He outlined that: (1) operational medical support to NATO forces should meet standards acceptable to all participating nations; (2) even in crisis or conflict, the aim is to provide a standard of medical care as close as possible to prevailing peacetime medical standards; (3) medical care should be continuous: a patient passing through the military-medical system from the point of wounding to the definitive care must be given continuous, relevant and progressive care; (4) the clinical condition of the patient will govern the priority, timing, means and destination of medical evacuation; and (5) time is a critical factor in patient survival and recovery; so it is the driver dictating the type and location of medical assets. Future developments and ongoing challenges of medical support in NATO, including the Defense Capabilities Initiative (DCI), were discussed. The overarching notion is that costs can be reduced, and capabilities optimized, by multinational approaches. In this regard, Lead Nation and Role Specialist Nation (RSN) arrangements can provide solutions, as well as the Multinational Integrated Medical Support Unit (MIMU) concept. The nucleus and command structure of the MIMU will be provided by a single nation, supplemented/augmented with capabilities, assets, and services of other nations. To realize this interesting concept, measures to improve planning, finance and quality of medical care on national levels are needed.

Paper #4 by MG Vovkodav (Main Military Medical Directorate of Ukraine Ministry of Defense) and COL Varus (RIMM, Ukraine), evaluated possible solutions for the current problems in the distribution and use of the limited military-medical resources in Ukraine. The authors emphasized that each medical support concept should include the health resources issue in terms of a determination of the needs, structure,

distribution and utilization. They classified the basic types of medical resources and provided a proposal for their proper utilization, arguing that national standards should become the basis for determining the rational use of the available medical resources. Furthermore, they argued that there is a strong need to establish an independent structure for the management of military medical support in Ukraine and a decentralization of the military medical service. But to achieve full success in resolving the problems, a full reorganization of the Ukraine medical support system is urgently needed, which is, of course, outside the scope and competence of the Ukraine military-medical service.

Health service support management at various missions of armed forces (Session II).

The papers presented in Session II covered pre-deployment medical readiness preparation (paper #5), post-deployment phase medical status monitoring functions (paper #7), and some aspects of primary medical care in Ukraine for troops in stationary dispositions (paper #6). The principal aim of these reports was to provide a complete picture of how the health of military personnel can be protected by determining, minimizing or eliminating the impact of risk factors and by providing adequate medical care, rehabilitation and long-term medical surveillance during each phase of deployment.

As was outlined by LTC Dr. Kasper (SHAPE) (paper #5), medical support options at different phases of troops deployment range from purely national resources on the one hand, to Multinational Integrated Medical Units (MIMU) on the other. NATO forces can be supported by any combination of the options available. While there may be significant advantages to using multinational medical support options, nations may choose to medically support their forces with a purely national effort. In the last case, the nation assumes the full responsibility for providing medical assets and evacuation means to their units. However, even in this case, the NATO commander retains the responsibility to coordinate the overall medical support.

A study by the Ukraine Armed Forces Research Institute of Military Medicine (RIMM), presented by COL Varus (RIMM, Ukraine) (paper #7) demonstrated that occupational hazards, combined with insufficient physiological, hygienic and social protection, are not just risk factors, but did cause a variety of health problems among a Ukraine contingent deployed on an international military mission. The health monitoring of the Ukraine contingent was carried out in two phases. In the deployment phase, all significant health risk factors in the area of deployment were determined, and primary countermeasures were implemented. In the post-deployment phase, the contribution of specific military and environmental factors influencing health status was assessed, and a rehabilitation program was put in place. It was established that there had been a substantial increase in combat and noncombat trauma’s as well as in disease incidence rates during deployment. As was shown, this was due to the impact of a complex of adverse environmental, occupational health, and other factors, i.e., combat injury, psycho-emotional and physical overloads, disturbances of sleep/wake rhythms, poor hygienic, nutrition and household condition. The main consequence was a high incidence rate of "occupational stress", as manifested by numerous cases of acute infection and by aggravation of chronic diseases. Based on these findings, a preventive, curative and rehabilitation program has been developed. The program includes improving the medical selection and the medical monitoring system, improvement of psycho-social support, etc.

Also since this study, a system providing permanent health monitoring and evaluation of risk factors, combined with adequate countermeasures, has been introduced. As an integral part of a national health monitoring system, a military-medical computer data-base has been created by the military-medical service of the Ukraine Armed Forces. The main aim of this monitoring system is to provide the decision-making military-medical authorities with adequate information. The computerized data-base of the Ukraine Armed Forces encompasses a territorially allocated system of databases which employs computer networks and telecommunication means. This system allows to survey the health status of military personnel on three levels (national, regional and territorial), to collect and analyze health status indices, and may be used for diagnostic, treatment and rehabilitation purposes.

Dr. Moskalenko and Prof. Ponomarenko (Ukrainian Institute of Public Health) presented a paper (paper #8) which was focussed on the reform of the Ukraine public health system, which has direct links with the medical support of the Armed Forces. In the past five years, strong initiatives have been undertaken to integrate the civil and military health care systems. Consistent with prevailing concepts, the medical facilities of the Ministry of Health will, in wartime, serve as components of the territorial hospital base, and will provide specialized medical care for the sick and wounded. The contribution of Moskalenko &

Ponomarenko is valuable for NATO as well as PfP countries, who will need to evaluate its possible utilization in their nations.

Special aspects of troops health service support (Session III).

Several topics relating to specific aspects of medical support were discussed in Session III (deployment phase medical readiness support; unified principles, requirements and standards of armed forces medical support; battle trauma, disease and non-battle injury (DNBI) management; the rehabilitation of the occupational health of pilots; the training of military-medical personnel; and partnership in the "Aerospace Medicine" research program).

In paper #9, LTC Kasper and MG Klein (SHAPE) argued that in addition to combat trauma, diseases and non-battle injures (DNBI) pose a considerable risk for military personnel. Medical support plans must include provisions for preventive measures and the means to implement them effectively. Morbidity surveillance and casualty reporting systems are also important functions to support commanders in protecting the force and in conserving the fighting strength and manpower of the force. The disease surveillance function serves as a key indication of troop health status, and as a key warning system or sentinel to trigger further investigation, preventive countermeasures, or other common actions to reduce the adverse impacts of health threats.

Paper #12 by COL Dr. Rödig (German Air Force) also focussed on battle trauma and DNBI. At the theater of war, estimated casualty rates form the core of all medical plans, medical services activities, as well as of estimates of the medical resources needed. In any scenario, the analysis of likely casualty rates and numbers has a great political and operational significance and is fundamental in establishing medical support requirements. The casualty estimate is a prediction of total losses of personnel in an operation due to various causes. Casualties are broken down into battle casualties (BC) and casualties due to DNBI. The casualty rate is a operational estimate of the number of casualties which will result from the operation, and it is expressed as a daily rate (number of casualties/100/day). Historically, casualty rates have given the military planners a frame of reference for the rates that should apply to a specific operation. Once the rates have been chosen, they can be applied to the force to be deployed to produce an estimation of casualties (both BC and DNBI). The process of casualty estimation for a specific operational plan draws on a broad base of knowledge, and employs three linked operational parameters:

- forces defined by size (the population at risk (PAR), configuration of operation (structural and functional organization), order of battle and scheme of manoeuvre;
- time during which a rate is applied;
- operational dynamics visualized as attacker-defender interactions.

A detailed analysis of expected sources of DNBI, based on historical and current data would enable medical and operational staffs, working in concert, to produce a provisional DNBI rate for the operation. This is a technical estimation of the probable rate of diseases and injures not resulting from combat, which can be expected in the force, once deployment begins. DNBI rate is mission dependent and dynamic, related to the level and nature of activity, the acclimatization, training and living conditions of the deployed personnel. The implementation of a morbidity surveillance system in NATO deployments will allow NATO to establish a library of health surveillance information that would assist medical support planning for future operations. A comprehensive DNBI analysis could produce more effective preventive medicine measures, including recommended immunization, prophylaxis and troop education policies. It could also be a driving factor in the size and capability of medical resources required in different scenarios.

In peacetime, emphasis is increasingly laid on preserving and rehabilitating the performance capabilities of military operators.

As was exemplified in paper #10 by COL Shakula et al. (6th Central Military Clinical Hospital, Moscow, Russia), the Russian experience confirms the need for treatments aimed at rehabilitating the functional status and performance capability of pilots. Various approaches are employed: psychological treatment, biofeedback, as well as pharmacological and other methods of treatment. According to COL Shakula's study, the introduction of such treatment systems has been successful in helping to rehabilitate the performance capabilities of military specialists, in preventing the development of cardiovascular diseases development and in reducing disability rates.

As was outlined by Prof. Sokhin (RIMM, Ukraine) (paper #11), the Military-Medical Doctrine (MMD) is the principal document to serve as a guide for commanders, military-medical authorities, physicians and planning staff. There are many approaches to the development of the MMD. Ukraine experts

have defined the MMD as the totality of general principles, single requirements and standards of armed forces medical support. The following key features and distinctions of the MMD can be distinguished: (1) the MMD applies to the medical support during any Armed Forces mission, including crisis and conflict. Moreover, health service support in crisis and conflict should be based on a progressive reinforcement of the peacetime military health care system; (2) the areas of application of the MMD should be extended to all military services and other key ministries; (3) doctrinal concepts apply to all types of medical support (curative-evacuation, hygiene-epidemiological, NCB defense, medical supply); (4) because wartime or special missions (disaster relief, etc.) require specific forms of medical support organization, the operative section of the MMD should be divided into separate chapters relating to missions other than war and to actions on the theatre of operations. Important aspects of the MMD apply to the development of a model of the military-medical system, the development of manuals and regulations, military-medical personnel training, research planning, and medical support organization and management.

Important illustrations of successful applications of the conceptions of the MMD were presented by MG Pasko (Ukraine Armed Forces) in his paper on the Ukraine military-medical personnel training and certification system (paper #13) and by Prof. Yatsenko (National Medical University, Kiev, Ukraine) in his paper on research activities in the aerospace medicine area (paper #14).

As MG Pasko explained, the postgraduate training of military physicians is based on doctrinal principles, requirements and standards, and is carried out at the Ukraine Military Medical Academy. There are also military-medical departments at the National Medical University for undergraduate civil and military medical education, and at the Vinnitsa military-medical college for the education of assistant military physicians. Thanks to these innovations, the Ukraine system for military-medical personnel training now corresponds to international standards.

Prof. Yatsenko pointed out that the Ukraine Ministry of Health and the Academy of Medical Sciences are jointly responsible for the scientific direction of aerospace medicine research in Ukraine. To realize this, seven committees have been set up, which focus on space ecology, space biotechnology, space radiation medicine, space pharmacology and toxicology, space biomedicine, telemedicine, and aerospace health care. The joint activity of the researchers in this project resulted in the formulation of a systematic approach to study the impact of space flight on living organisms including humans. New findings on the influence of space flight on developing organisms, acsone transport, and the reproduction system have been obtained.

Medical supply and technologies (Session IV).

The military-medical services of NATO and PfP countries widely use information technology (IT) for information collection and exchange, as well as for diagnostic and curative purposes. Presently, the Composite Health Care System is under development. It will include automated administrative management, teleconsultations, control of the treatment process, the rational use of medicines and materials, etc. Modern advances in biotechnology open the way to develop and implement new methods for diagnosis and treatment. The papers presented in session IV focussed on the development and application of telemedicine in Ukraine; the status, perspectives and implementation of NATO medical standards; Ukraine branch standards for medical technologies; and the use of new immuno-genetic approaches to the prognosis of health and performance capabilities among military personnel.

As was outlined by Dr. Mayorov et al. (Kharkiv Medical Academy, Ukraine), the health care system in Ukraine has, in recent year, been strengthened by the introduction of national medical network and databases (paper #15). The two most developed medical networks operate within the framework of "HealthNet". The most ramified of these two is the national database of the Chernobyl disaster, which monitors the health of more than 700,000 persons. The second most ramified network is the Sanitary-Epidemiological Service of the Ministry of Health, which provides links with several regional computer centers. A third medical network has been created for the monitoring of oncological patients. This network provides links of the regional oncological facilities with the Institute of Oncology in Kiev.

The foundation for a comprehensive medical informatics infrastructure has been laid by the creation of the National Direct Access Computer Network “UkrMedNet”. The goal of “UkrMedNet” is to provide an infrastructure for the operation of all existing and future medical networks and telemedical consulting centres, and to organise a system of medical and ecological information exchange in as well as outside Ukraine, based on the state-of-the-art communication technologies. The development of the Ukrainian

National Medical Network has greatly increased the possibilities for the exchange of medical, ecological and scientific information. Physicians, scientists in R&D institutes and universities have obtained access to the necessary information, receive electronic copies of scientific journals and articles, and are able to run more sophisticated programs. The national Ukraine system for organ, tissue and cell transplantation, which is connected with "Eurotransplant", will be incorporated in the unified European organ transplantation computer system, giving Ukraine a real opportunity to join the progress in this field. The IT, adapted to national conditions, will be created for supporting organ, tissue and cell transplantation on national and regional levels. Based on international experience, a technical project with standardized patterns of data bases and solutions will be created, as well as standard program modules with standard input and output files to ensure the functioning of all data bases at a higher level.

The important issue of medical standardization within the national and international military arenas was addressed in paper #16, which was presented by COL Dr. Lam (NATO-IMS). While there are some areas for which interchangeability is already achieved (ammunition, some equipment), it is obvious that in many other areas (quality of medical care, health status standards) this problem is only in the first stage of undertaking. NATO medical forces have concentrated their efforts for the most part on materiel and procedural standardization, rather than on direct patient care. NATO has very few standards on "how to do it" clinical practices, although as NATO troops operate more and more in collaboration with non-NATO nations, the need to develop clinical practice standards has increased in recent years. Standards currently under developed or subject to improvement include emergency medicine procedures, treatment of climatic injuries, improved immunization requirements, the use of standardized external orthopedic fixators, and preventive medicine procedures. It is generally recognized that there are four levels of standardization which may be considered acceptable in different circumstances: (1) compatibility, (2) interoperability, (3) interchangeability, and (4) commonality. Compatibility means that one system or procedure does not interfere with another; interoperability refers to the capability of systems, units, or forces to provide services to and accept services from other systems, units, or forces and to use the exchanged services to enable them to operate effectively together; interchangeability means that equipment used by one system can be exchanged for equipment used by another system without modification; commonality is defined as the use of the same doctrine, procedures, or equipment. The guiding principles for standardization within NATO are:

- Standardization is voluntary—no nation can be forced to agree to standardize anything. Nations will do so only if they agree that it is in the interests both of the Alliance and of the nation.
- Standardization is not an end in itself. It is desirable only if it increases operational effectiveness and efficiency in the use of resources.
- Some degree of standardization is essential for implementing plans. Other degrees of standardization may be desirable if they enhance the implementation of plans or enhance resource management.
- Interoperability is the minimum level which is desirable.

Equipping forces is a national responsibility. NATO as an organization does not own much equipment or forces, most of which belong to the nations.

Common terminology is essential. In fact, it is the bedrock of standardization.

The types of issues which have successfully been standardized within NATO, generally fall into three categories:

- Operational, including military practices, procedures, and formats (this category applies to doctrine, tactics, training, logistics, etc.);
- Materiel Specifications, including engineering or production codes, systems, components, and consumables;
- Administrative, including terminology in all fields as well as non-military administration.

There are currently more than 130 medical or medically-related NATO Standardisation Agreements (STANAGs) either already promulgated or under development, ranging from equipment specifications to operational procedures. The MAS Working Groups have recently been tasked to produce a list of "Essential STANAGS" which non-NATO nations should accept before participating in a NATO-led operation.

As was outlined by Dr. Ponomarenko et al. (Ukraine Institute of Community Health, Kiev, Ukraine) in paper #18, institutional standards for medical facilities in Ukraine should correspond to the national standards. Where possible, local standards may comprise extra medical services, more comfortable accommodation for patients, etc., but their level should never be lower of the national medical standards. The introduction of branch medical standards is aimed at providing patients with minimum levels, type and

quality of medical care. The proper implementation of branch standards is supervised by internal departmental bodies (the Ministry of Health), as well as external bodies (public organizations, insurance companies, etc.). After the introduction of a mandatory health insurance system in Ukraine, the medical standards have obtained the status of legal documents for insurance companies, serving as financial documents. They can also be used in accreditation procedures for medical facilities, a process which is regulated by the Ukrainian Council of Ministers and the Ministry of Health. The branch standards are intended to protect the rights of both medical workers and patients, and to serve as a guarantee for observing the principles of equality in providing of medical care.

Suggestive and important empirical findings were presented by Dr. Afonina et al. (National Medical University, Kiev, Ukraine) in paper #17. The scientific and practical cooperation among medical specialists of the Research Institute of the Military Medicine of the Ukraine Armed Forces, the Main Military Clinical Hospital and the Research Center of the National Medical University has resulted in the development and introduction of new principles for medical selection and for the dynamic monitoring of the health status of military personnel which has been exposed to ionizing radiation, toxic substances or other health damaging factors. The most important element of this methodology is its unified approach to make a prognosis of the health status. The approach based on the detection of individual genetic markers – "the genetic passport" which provides indices of the status of the homeostatic systems (nervous, immune and hormonal). The genetic markers provide insight in the direction and intensity of adaptive responses, thereby providing information concerning individual predispositions to the development of pathology as a consequence of the impact of hazardous factors. The great value of this approach is that it is universal and cost-effective, and that it provides long-term and short time prognoses of the health status and performance capabilities of the military personnel. The immune-genetic approach is based on evidence that human leukocyte antigens (HLA) - the major histocompatibility complex – play a leading role in determining human individuality by controlling the biochemical and physiological responses as well as an antigenic spectrum of proteins, enzymes, nucleic acids, and antioxidants. A large-scale immuno-genetic analysis was carried out and associations were determined of HLA-antigens with the risk for the development of health complaints after exposure to low doses of ionizing radiation (LDIR). It was found that the HLA-antigens • 2, • 9, • 10, • 8, • 12 and • 14 are associated with increased health risks among military personnel working under LDIR exposure. Resistance to radiation exposure, on the other hand, was found to be associated with • 3, • 19 and • 7-antigenes. Furthermore, • 3-B5, A3-B8, A2-B7, A19 and B12 HLA-antigens indicate a low resistance of the individual to LDIR. Individuals characterized by • 10, • 12 and • 8-antigens form a risk group for the development of inflammatory and free radical injuring processes.

In summary, this immuno-genetic approach appears to be of great promise for the development of new methodological and organizational principles of medical surveillance, for the rehabilitation of military personnel working under extreme conditions.

Principles and policy of medical evacuation (Session V).

The main objective of Session V was to discuss the concept of medical evacuation for NATO combined joint operations. In the discussion, the principles and policies dictating the organization and capabilities of medical evacuation were reviewed, and the development of multinational integration was evaluated.

Current medical evacuation concepts do not impose any single evacuation system. Rather, a was emphasized by COL Dr. Lam (NATO - IMS) in paper #19, the general medical evacuation concept enables nations to establish their national evacuation policy and procedures as far as possible. At the same time, it encourages cooperating non-NATO nations to plan for reliable, cost–effective medical evacuation systems. This concept can also facilitate bilateral or multilateral agreements and promote common planning, programming, and training. Operations during Desert Storm demonstrated that the old concept of having large forward medical facilities which could provide definitive surgery of all patients and hold them until they were ‘stable’ is no longer viable. It became evident that the movement of ‘stabilized’ or ‘unstable’ patients would become the norm, and most of the major nations have now implemented systems to ensure the provision of highly-trained medical aircrews and ‘intensive care unit’-like equipment in both fixed and rotary wing ambulances. Of interest is the fact that the civilians seem to be leading this move. With a few exceptions, such as the ability to move highly infectious patients in P4 containment, civil organizations are leading the way in acute care in the airborne environment. Many university hospitals have developed air

ambulances with capabilities far in advance of those of military services, and the military are only now starting to catch up.

The transformation of the security environment in Europe has had a profound effect on NATO. Major reductions in the levels of armed forces, combined with new or expanding tasks (such as IFOR, SFOR, and KFOR) have presented significant new challenges to NATO's medical staffs. On the one hand, "peacetime level" quality of care is demanded, while on the other hand, there is a demand for decreased deployments of increasingly scarce medical resources. Thus, the concept of putting large medical establishments on the ground in the forward area is rapidly losing favor, in light of improved evacuation systems. In the near future, the majority of evacuation will be by means of multinational aeromedical evacuation (AE). Present evacuation trends indicate that both air and ground ambulances will serve in the battle areas of the future, but the increased depth, width, and complexity of the operational areas indicates a recurring need for both lateral and rearward movement. It therefore becomes obvious that, so long as air supremacy can be maintained, the bulk of the workload will be via airlift, rather than via ground means, especially in Crisis Response or Peacekeeping Operations. Improved medical care capabilities being placed in the American UH-60Q model Blackhawk helicopter, the critical care transport teams of several nations, and such new items of equipment as the portable LSTAT (Life Support for Trauma and Transport) intensive care unit are only now being fielded. Some nations have developed intensive care "boxes" which can be placed in certain types of commercial aircraft, but unfortunately these are available in very limited quantities, and can provide care for relatively few patients. Unfortunately, development in this field is very uneven, with some nations being far ahead of others, some of which are still in the WWII era as far as quality of in-flight care is concerned. NATO is devoting much effort to development of standardization documents which will enhance interoperability of national air ambulance systems, and which will eventually lead to truly multinational capabilities in this arena. To date, there are such agreements covering litter specifications, on-board medical equipment, medical crew training and staffing, and administrative requirements. Others are currently under development. Medical evacuation regulations outline that movement of casualties is not their simple transportation to a suitable treatment facility but is part of the continuum of their care and treatment.

Col Dr. Rödig (German Air Force) provided further background to AE in paper #20. AE is increasingly used in military conflicts as well as disaster relief operations (#20). It is usually the fastest and in many cases the only life saving mode of transportation. It is conducted in the knowledge that the immediate clinical care for acute conditions will decisively improve the patient's prognosis regarding mortality, invalidity and the development of posttraumatic stress conditions. In view of this, the modular medical facilities in the operational theater are indispensable assets of the qualitative and scalable medical support that must be complemented at all levels by aircraft that are properly equipped and assigned to air transportation forces. In view of the maxim of medical support during operations abroad, various traumatic/posttraumatic conditions require fast AE from level B (clinical and ambulant treatment of acute conditions) to a medical facility at level C (further clinical care outside the operational theater) for definite treatment and for the relief of the modular medical facilities (maintenance of personal medical care). These traumatic/posttraumatic conditions include: (1) severely burnt patients, who can be evacuated to special clinics with comparatively little effort during the first 24 hours after incurring the burn and subsequent to first clinical treatment to ensure the provision of an adequate therapy (transplantation surgery, dialysis, intensive medical care); (2) polytraumatised patients with or without burns and an imminent posttraumatic, dialysis-requiring renal failure with the consecutive failure of several organs must be evacuated to medical facilities capable of providing dialysis, after emergency surgical treatment; (3) neurologically traumatised patients, who, after the necessary neurosurgical treatment, must be evacuated to an appropriate level C medical facility for further care and rehabilitation (apallic syndrome, tetraplegia); and (4) toxicological diseases of patients exposed to chemical warfare agents indicate long term respiration, especially in the event of inhalation traumata, which requires the evacuation from the operational theater to relieve local medical capacities.

As was noted by Prof. Bebeshko et al. (Academy of Medical Sciences, Kiev, Ukraine), the end of the 20th century and the coming 21st century are marked as a time of high risk postindustrial societies (paper #21). Natural and man-made disasters, catastrophes and accidents have become an unfortunate but routine part of our life. One of such sad events was the Chernobyl nuclear power station catastrophe. The experience of relief operations in this catastrophe has demonstrated the importance of civil-military cooperation. One of the most important elements in disaster medicine system is the emergency response team. The team is designed to carry out the following actions: (1) immediate qualified medical care for victims of the

catastrophe; (2) determination of the contamination levels and individual exposure doses; (3) triage, preparing for evacuation and hospitalization of patients; (4) operative communication with the Ministry of Health; and (5) interaction with corresponding organizations and establishments working on the spot.

Ukraine has obtained unique experience in disaster relief management in the largest radiation catastrophe in the world and in monitoring of the health status of hundreds of thousands exposed military and civilian persons. Rescue, evacuation and timely health care for the victims of such catastrophes are a crucial part of this experience. The Ukraine experiences are available for assessment by many nations.

Conclusions and recommendations

Recent major world and national events have radically altered the global picture and have reshaped the NATO strategy from a primary focus on international conflicts to a focus on missions other than war (peacekeeping, humanitarian, disaster relief, etc.). Most of these missions are performed by multinational forces, which requires the cooperation of all military services including medical support systems. This new objective has required radical changes in the organizational structure, management, and supply of national and allied military health systems. The presentations and discussions during this HFM Panel Specialists' Meeting have provided a unique opportunity for an evaluation of the progress that has been made in improving the Armed Forces medical support on national and international levels. At the same time, many aspects of military personnel health protection remain to be improved, and the military and civilian health care systems of many Partner nations need to be reorganized to meet modern standards. The main areas which require further study, discussion and improvement are the following:

1. Principles and policies of medical support (Military-medical doctrine). The national military medical services must develop, enhance and sustain a coordinated and synchronized doctrine that facilitates medical planning, resourcing, and execution of national, joint and combined operations. Successful initiatives include the development of a joint medical doctrine serving as a guide for medical planners. The doctrine should be an authoritative document, but it will require judgement in its application. The principal point is that the military-medical doctrine should be applied to all armed forces missions, ranging from humanitarian operations to warfare. That is because health service support in crisis and conflict is based on the peacetime military health care system, and is progressively reinforced. Medical service formations must therefore be ready for the smooth transition from peacetime to war. To cope with this requirement, the operational sections of the doctrine should have separate chapters relating to the military operations other than war (MOOTW). The timely emergence of a new joint doctrine regarding MOOTW, specifically addressing medical missions, roles, and functions, should significantly enhance program and operating planning clarity. There is also a need to enhance joint, combined and multi-agency training in MOOTW across the total force and with civil organizations and agencies.
2. Standardization. So far, medical services have concentrated their efforts for the most part on material and procedural standardization, rather than on direct patient care. It is time now to identify general requirements for military-medical standards, develop their classification and to approve a list of the most important international standards acceptable for NATO and PfP countries. The nations are certainly free to develop and approve their own standards. However, national standards should correspond with international standards. Military-medical standards must be equal to national health standards; standards of war time should correspond to standards of peacetime.
3. Sharing responsibility for the health of military personnel. The occupational health of military personnel is a crucial component of their combat strength. To optimize occupational health is a joint responsibility of military commanders and medical services. The most important requirement to realize this is that all relevant authorities are aware of their responsibility for the preservation of health among military personnel. Military and non military medical leaders of all levels must get better acquainted with military medical doctrine, tactics, techniques, and procedures. The military medical departments must be prepared to respond effectively and rapidly to the entire spectrum of potential military operations – from major regional contingents to MOOTW. Senior leaders must recognize advancements in medical practice and technologies, through training and acquisition initiatives, which sustain the ability to provide medical care during any contingency and under the most austere conditions.
4. Research and development. The biomedical R&D program should be promoted and accelerated in the areas of casualty and DNBI care and management; casualty prevention; protection against infectious

diseases; NBC threats; combat stress and fatigue prevention and control; preservation of occupational health; development, evaluation and application of advanced military-medical technology and information systems.

5. Training. Although a graduate medical education and postgraduate course training policy has been established in Ukraine, its implementation continues to be lacking. Medical departments and commanders must continue their efforts to define medical readiness training standards, joint training requirements, and the resources required. Medical participation in joint and combined exercises should be increased.

6. Medical evacuation. The current system of medical evacuation must be reviewed to ensure that all participating services are properly organized, trained and ready to perform an effective evacuation policy. The focus should be on establishing a patient reception and distribution capability that supports the patient movement requirements. It is essential that territorial capabilities and a strategy for activation of area treatment capabilities be developed. Alternatives to patient transportation by air must be quantified by each service. Current medical evacuation doctrine assumes that all patients will be decontaminated before they are transported. However, some biologically contaminated patients are evacuated on a case-by-case basis. Procedures must be developed for evacuating contaminated casualties.

7. Territorial system of medical support. The territorial principle of Armed Forces military-medical support becomes predominant in the Ministries of Defense of NATO countries and in some PfP nations including Ukraine. This principle is closely related to the problem of integration of civil and military health care systems. According to modern concepts, the civilian medical treatment facilities are planned to serve during wartime as the core components of the territorial hospital base (V level of medical care) by providing specialized medical care for sick and wounded. This concept is very valuable for many NATO and PfP nations.

8. Interaction between the military-medical services of NATO-countries has evolved from sharing national experiences, through cooperation in selected areas, to partnership. This Specialists' Meeting has encouraged the establishment of medical treatment facilities composed of different national modules (MIMU's). The nucleus and the command structure of the MIMU will be provided by a single nation, supplemented / augmented with capabilities, assets, services provided by other nations. To realize this idea, measures to improve planning, finance and quality of medical care on a national level should be undertaken.

9. Accessibility of advanced technologies, especially the implementation of telemedicine into military-medical support at different levels (echelons) of medical care and treatment (battlefield, aid stations, field hospitals, rear clinical hospitals and rehabilitation centers) should be carefully reviewed by experts of NATO and PfP countries. Medical, technical, legal and financial aspects of the application of medical technologies should be taken into account and thoroughly evaluated.

10. The HFM Panel is encouraged to organize meetings or workshops on the next topics: (a) Stress disorders in military personnel participating in multinational missions other than war; (b) Participation of military formations in large-scale disaster relief operations; (c) Biological threat and biological security in 21th century: lessons from the past, challenges for the future.

11. The "Multinational phrase book for the use by the NATO medical services" (STANAG 2131) and the "NATO glossary of medical terms and definitions" (STANAG 2409) are limited to Alliance terminology and experience. In order to add terminology based on the experience of PfP countries, a multinational team of experts should be established, whose main task would be to prepare and annually revise an encyclopedic alphabetical reference-book on military and emergency medicine.

Medical Support of Armed Forces of Ukraine: New Vision of Organizational Structure and Management

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In recent years, the contribution of the human factor (personnel combat strength) to the fighting readiness of combat troops has increased considerably. On the one hand, the use of weapons with highly destructive characteristics may not only cause losses in manpower on a significantly higher scale, but these losses also have different characteristics (large numbers of multiple injuries, in addition to combat stress and fatigue). On the other hand, the armed forces of the civilized nations consist of military specialists managing modern military technologies. As is well known, the expenses of training a modern high quality military pilot training costs several million dollars, which is comparable with the cost of a jet-fighter. Therefore, the health and professional sustainability of military experts has obtained strategic importance.

Another feature of the present situation is the reorientation of the military doctrines of many countries to participation of their armed forces in peacekeeping, humanitarian and disaster relief operations. The military-medical doctrines which are currently being developed by NATO, Russia and Ukraine, are aimed at carrying out of these new roles.

Presently, multinational forces of NATO nations and PfP countries, including the Ukraine peacekeeping contingent, are fulfilling many of the missions mentioned above. In connection with this, there is an increase in the need for exchange of information and experience between the national military-medical departments and services. Such exchange is the main task of the current Specialists' Meeting.

The importance of this event is great, because many of its recommendations to the military-medical services equally apply to the civil health care services of many countries. The Specialists' Meeting focuses on the interaction between the military and civil health care systems, the rational use of limited medical resources, medical care standards, medical information systems, etc.

The purpose of the present report, which can be important for international medical community, is to describe the problems the Ukraine Armed Forces are currently facing in the area of military medical support.

We have developed a concept for a new system of military-medical service, which is capable of providing modern quality standards of medical care. The concept aims at establishing a military-medical service which will include and combine three managerial infrastructures (curative-prophylactic, hygiene-epidemiological, and military-medical supply) and two systems (training of military-medical personnel and research). Some sections in the program have already been realized. Military-medical personnel is being trained at the Ukraine Military Medical Academy, which was founded in 1996. There are also military-medical faculties at the Kiev National Medical University and at the military-medical college in Vinitsa. In

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addition to this, there are groups studying military methods in the emergency medicine faculties of civil medical institutes. All graduates of these institutes obtain the rank of reserve officer and they form basis for military academy and armed forces service admissions. Due to these innovations, the Ukraine military-medical personnel training system is now meeting international standards.

A course on "NATO Armed Forces medical support" has been introduced in the curriculum of the Ukraine Military-Medical Academy. Courses on "Curative-evacuation support of NATO Armed Forces" and "English-Russian-Ukrainian alphabetical reference-book on military and extreme medicine" are being prepared. In addition, a military medicine research capability has been established. The main research establishments are the Ukraine Military-Medical Academy (UMMA), the Research Institute of Military Medicine (RIMM) and the Main Military Clinical Hospital (MMCH). Scientists at the UMMA are working on the organization of medical support to the Armed Forces, medical radiology and toxicology, improvement of the treatment of patients and wounded, and pedagogic and educational issues. The UMMA research center serves as the coordinating body for the Surgeon General, and is assisting him in the supervision of the military-medical research area. The RIMM is the main executor of research on occupational medicine, improvement of the organizational structure and management of the medical services, medical evaluation of armament and military engineering, and other issues. The RIMM consists of 2 boards, 7 departments and 17 laboratories. The MMCH units and clinics serve as a base for UMMA for the training of military physicians and research on the organization of outpatient and hospital medical care, the improvement of the quality of medical care and medical expertise, etc.

All three components of military-medical organization cooperate closely, which allows them to avoid duplication in research planning, and a rationally use of the scientific staff and resources. Additionally, the links between the research establishments of the Ministry of Defense and leading research institutes of Ministry of Health, as well as the Ukraine Academy of Medical Sciences have been strengthened in the last five years.

Presently, we have managed to realize one of three planned managerial infrastructures, the system of hygiene-epidemiological surveillance. The hygiene and epidemiological service of the Ministry of Defense is organized on a territorial principle: from the Central Hygiene and Epidemiological Department downward to the regional hygiene and epidemiological laboratories. Due to our efforts, this service is no longer subordinated to the military and medical commanders. This allows it to carry out surveillance and effective measures independently. As a result of the reorganization, the epidemiological situation in Armed Forces has been improved. This success is expressed in a 30 % reduction in the outbreak of epidemics and in the number of victims. However, infectious diseases remain an important risk for the Ukraine Armed Forces and for this reason commanders and the military-medical service give special attention to this problem.

The second managerial infrastructure deals with military-medical supply. According to the proposed model, it includes the Office of Logistics, within the structure of Main Military Medical Directorate (MMMD), the central, regional and territorial medical stores, the pharmacies of the base and garrison military hospitals and other military treatment facilities. The managerial infrastructure of military medical

supply will, by analogy with the infrastructure of the hygiene and epidemiological service, be entirely under the supervision of the MMMD, through the Office of Medical Logistics. Medical supply combines the principles of centralization and decentralization. Purchases of large quantities of medicine and equipment are made on a centralized principle. Purchases that are necessary in limited amounts or for urgent needs, are made on decentralized principle. In the future, a decentralized system of medical supply will be introduced, in a more flexible and economic way, which will allow to operationally respond to the current inquiries.

The third managerial infrastructure, the curative-prophylactic, is in the stage of development and consideration. Essentially, it will encompass a medical care and treatment system which is based on territorial principles (zone of responsibility), with a range of medical treatment facilities: 1) the Main Military Clinical Hospital will provide highly specialized medical care, 2) the Central Military Hospital will provide specialized medical care, 3) the Base Military Hospitals will provide specialized and qualified medical care, and 4) the Garrison Military Hospitals will provide qualified primary care. In this managerial infrastructure, the MMMD carries out the general management of the curative-prophylaxis support, while the Medical Services of the Army, Air Force, Navy and Operational Commands provide class and field combat exercises to increase the readiness of the medical service to act in extreme situations, in peace as well as in war time.

The proposed managerial infrastructure will allow the MMMD to conduct independent planning, personnel selection, financial and supplying policy, and to eliminate inter-service barriers by the organization of the medical support system on territorial principles. It will also enable us to revive the medical service at the military unit level, where up to 70 % of all cases of diseases and traumas should be prevented and treated.

At present, the curative-prophylaxis managerial infrastructure has been developed as a structural model, the staff and equipment have been designed, the management mechanism has been determined, and it has begun to be implemented in the structures of operational commands. However, its practical implementation will require further significant effort, specifically with respect to the development of legal procedures and of mechanisms which will put the command and financial authority into the hands of the MMMD.

The legal and financial support of the curative-prophylaxis managerial infrastructure will eliminate double expenses of the limited medical resources, will create conditions for an extension and improvement of the out-patient medical care, will reduce the duration of hospital admissions, and will stimulate the development and implementation of modern standards in the medical services.

Ukraine experts and scientists are currently developing a Military-Medical Doctrine (MMD), in which the combined experiences concerning Armed Forces medical support of the former Soviet Union, NATO nations, and Russia and Ukraine will be utilized. The MMD will become the official document regulating the unified principles, requirements and standards of medical support of the Armed Forces during all their activities. It will define and determine the specific responsibilities and command authorities of the

medical services, and its primary aim will be the preservation and strengthening of the health of military personnel.

The principles of the MMD will become the basis for the development of the model of the military-medical service of the Ukraine Armed Forces-2010. The model will include a close integration of the military and civilian health care systems, priority principles for medical service financing, a definition of the medical budget structure, a revision of the role and functions of the military-medical service commands, the development of modern forms of management and information support, and provisions for the training of the new generation of military-medical specialists.

International cooperation plays an important role in the realization of the reform of the Ukraine military-medical service. From our point of view, the primary topics for cooperation are:

a) studies of the experience of the military-medical support system in NATO nations and in other leading western countries in the following areas:

- optimization of the management structure of the medical services;
- re-structuring of the military-medical service and optimization of the organization structure of medical facilities;
- rational use of medical resources;
- quality control of medical care;
- introduction of new technologies in curative-diagnostic process;
- improvement of the training of military-medical personnel ;
- practical use of military-medical standards;

b) international research cooperation in:

- scientific support for the reform of the military health system;
- joint research on military pathology and its influence on troops combat readiness;
- joint development of the military-medical doctrine;
- study of the incidence rates, prevention and control of militarily relevant infectious diseases;
- development of countermeasures against biological terrorism;

c) international humanitarian medical aid to Ukraine (medical equipment, pharmaceuticals diagnostic means).

Ukraine offer s to cooperate with other nations on the following issues:

- participation in joint exercises of multinational forces;
- participation in international scientific meetings, seminars, symposia;
- participation in medical support of peacekeeping and humanitarian missions of UN and NATO;
- bilateral and multilateral meetings of official representatives of military-medical departments of Ukraine, NATO nations and other countries;
- exchange of information in working groups to study specific topics of military health care;
- training of Ukraine military-medical personnel in foreign treatment facilities and teaching institutions;
- exchange of scientific and practical information.

A successful implementation of the planned program for a new military health care system in Ukraine, based on the principle that the preservation of the health of military personnel is an issue of national urgency, will be one of the most important criteria for the success of the entire reconstruction and development program of the Ukraine Armed Forces.

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NATO Medical Support to Crisis Response Operations - A Strategic View

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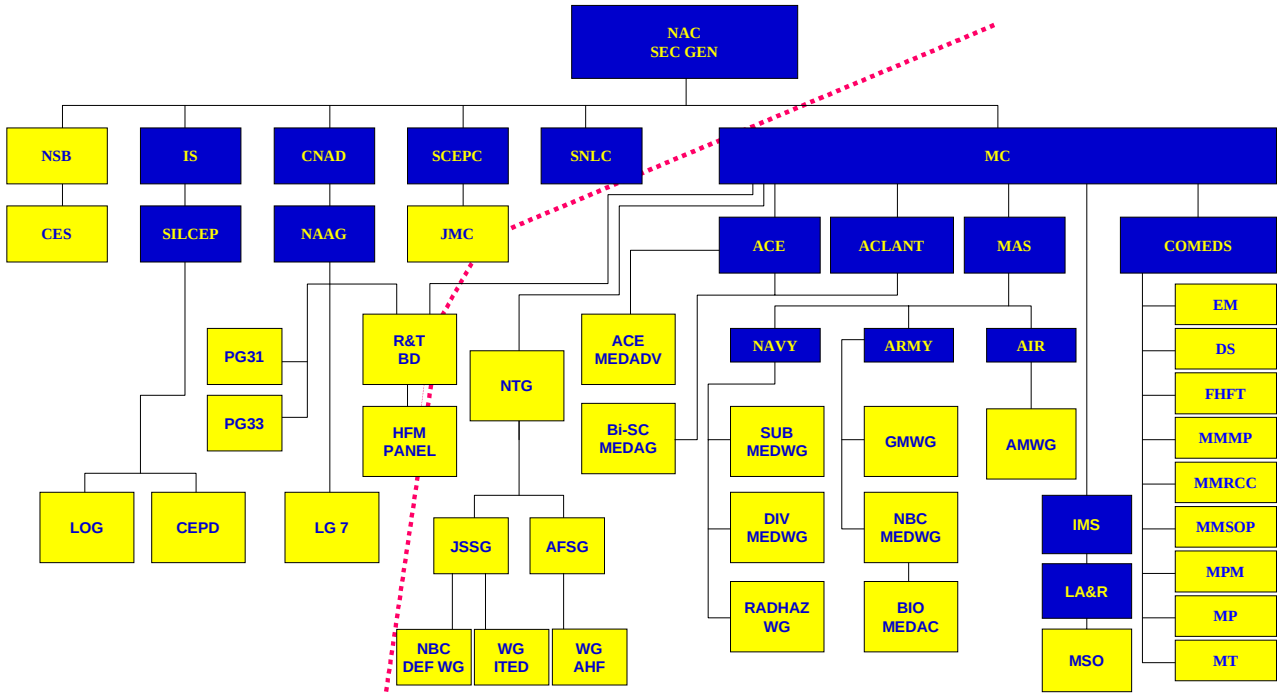
SUMMARY:

The paper will present the Strategic Command Europe's view on multinational medical operations including current developments and the way ahead.

DISCUSSION:

Medical Co-ordination in NATO

Medical Co-ordination in NATO is very complex. The purpose of the following diagram on medical co-ordination in NATO is definitely not to provide an overview of the principles, organisation and key bodies of NATO, but to give an idea of the complex and sometimes arcane ways in which they all affect medical planning in NATO.



The dotted red line divides the diagram into the civilian area of NATO on the left side of the slide and the military area on the right side. The organisational boxes in yellow represent NATO committees, working groups or sub-groups, which have or could have some direct medical activities, while those in blue do not; the latter are shown only for an overview of the organisation.

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The bottom line of this picture is:

- Medical planning in NATO is complex and often confusing.
- There are many opportunities to participate in the process.
- However, most participation is on a national basis, and committee members are appointed by nations.

The NATO Nations' Surgeon Generals recently clearly stated their wish to modernise our medical services to peacetime standards. During the following minutes I will focus on the relationship of "medical" and "logistics" in NATO, the medical representation in the HQ architecture and responsibilities, the medical C2 structure in a joint environment, the medical support principles and policies and, I will provide an outlook.

Relationship of "Medical" and "Logistics" in NATO

We all know logistics has to ensure the movement and maintenance of forces, materiel readiness to include necessary infrastructure and services and also medical support. However, it is well understood that the medical support function has a unique non-transferable responsibility to maintain and recover the health of the fighting force. Officially, in NATO, medical and health support is part of logistics. In spite of that I would like to comment that this fact does no longer reflect the organisational structures of several member nations, where the medical service or staff is not part of logistics.

Health preserving and life saving measures have to comply with different basic rules than those applying to logistics:

- While a unit can be made logistically self sufficient for a planned number of days, it is not possible to make it medically self-sufficient.
- Indeed a complete and effective evacuation and treatment system needs to be available from the earliest stages of a deployment.
- The time frame in which a wounded patient must receive emergency surgical treatment is extremely limited.
- Every delay will lead to a higher morbidity or mortality.
- Medical personnel, materiel, and infrastructure are protected under the GENEVA conventions.
- Medical personnel therefore have non-combatant status. They must deploy their facilities away from targets of opportunity such as logistics installations, and as such cannot be members of local defensive forces.

Medical Representation in the HQ Architecture and Responsibilities

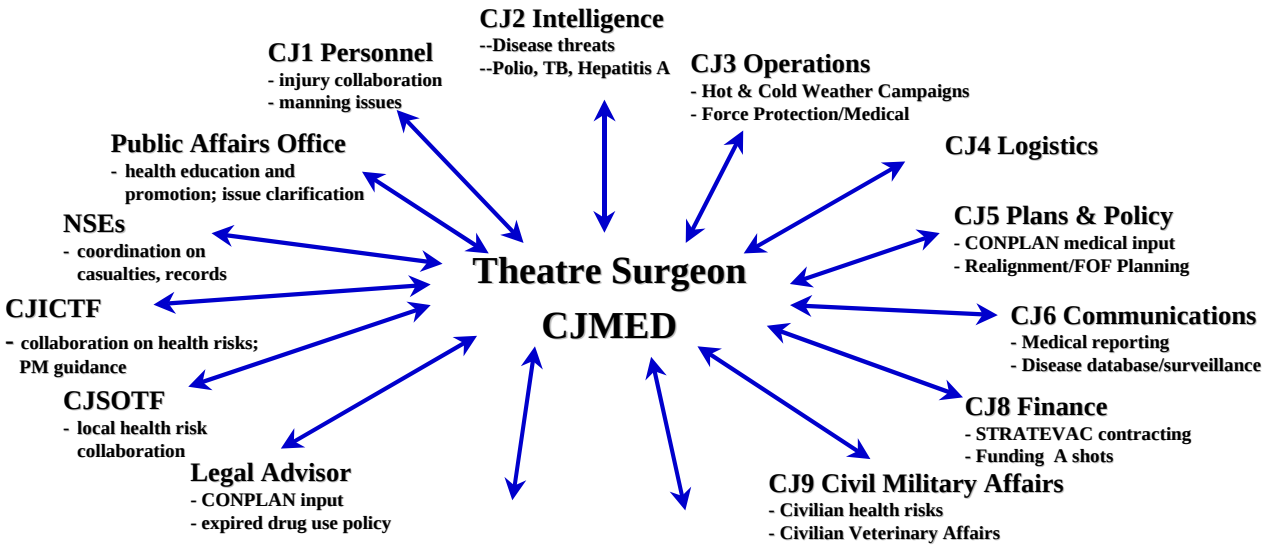
The provision of medical support is a command responsibility performed by the medical services. On behalf of the commander, the medical service must contribute to the achievement of the mission by conserving manpower. Since the main activity of medical and health support is humanitarian in nature, medical units are precious assets, which as well can be used for Crisis Response Operations (CRO). Humanitarian medical relief can make a positive psychological impact on public opinion at home, as well as in the disaster area itself. Finally, it is generally accepted that a perceived lack of medical support can significantly reduce the soldier's morale and will to fight.

The medical service performs this mission through the following roles and tasks:

First, the prevention measures are multiple and include:
- provision of advice and on health matters affecting operations;
- provision of appropriate immunisation and prophylactic measures for the area of operation;
- provision of health education and health promotion programs in the field of hygiene and sanitation;
- determination of medical fitness for operational personnel;
- determination and provision of NBC prophylactics.

Second, evacuation encompasses the control and co-ordination of a casualty evacuation system, including aeromedical evacuation and medical regulating.
Third, treatment including promotion of first aid training; also provision of medical care and hospitalisation.
Fourth, the provision of medical logistics, which is actually the closest to a traditional logistics' function.
And finally, research and development aiming at providing the latest advances in prevention, diagnosis and treatment.

The following picture reflects the current situation in the well-developed and mature SFOR theatre. It might look very busy and complicated. What it actually depicts is the interface between all medical military matters and the rest of the military world.



The main interface medical has is with J4 Logistics. However, as you can see from this slide there are many other areas with which medical must co-ordinate and co-operate. The interface with Personnel is multifaceted and includes important subjects such as international law, patient regulating and tracking, and the maintenance of force strength through protection and preventive measures. Medical Intelligence plays an important and an increasing role in prevention and pre-emption of diseases in current and future operations. The intelligence community now fully recognises medical intelligence as a sub-set of intelligence as a whole. The medical planner, as an interface with operational staffs, has to be fully aware of current and future activities and this at an early stage. As a result, the medical support plans will be fully integrated in the overall operational plan. You are all aware of the fact that the estimates of battle casualties and DNBI are of particular interest for the commander, as they will predict the losses. It is also common knowledge that medical support will be a crucial part of the integrated mass casualty plans. Further, medical support to operations can not exist without an efficient and comprehensive medical communication system. It will range from operational communications links to high sophisticated information technology such as telemedicine. Civil military affairs (CIMIC) is another important area with which the medical organisation interfaces. NGOs, such as ICRC or “Medecins sans Frontieres”, play an increasing role in humanitarian aid, which of course has medical implications. This represents a shift in the focus on military operations, which must be addressed through our doctrine and must be complemented by appropriate manpower resource. Last but not least important are the interfaces with legal advisors, engineers, national support elements (NSEs) and other staffs. In conclusion, medical military staffs operate in a highly specialised and multifaceted environment.

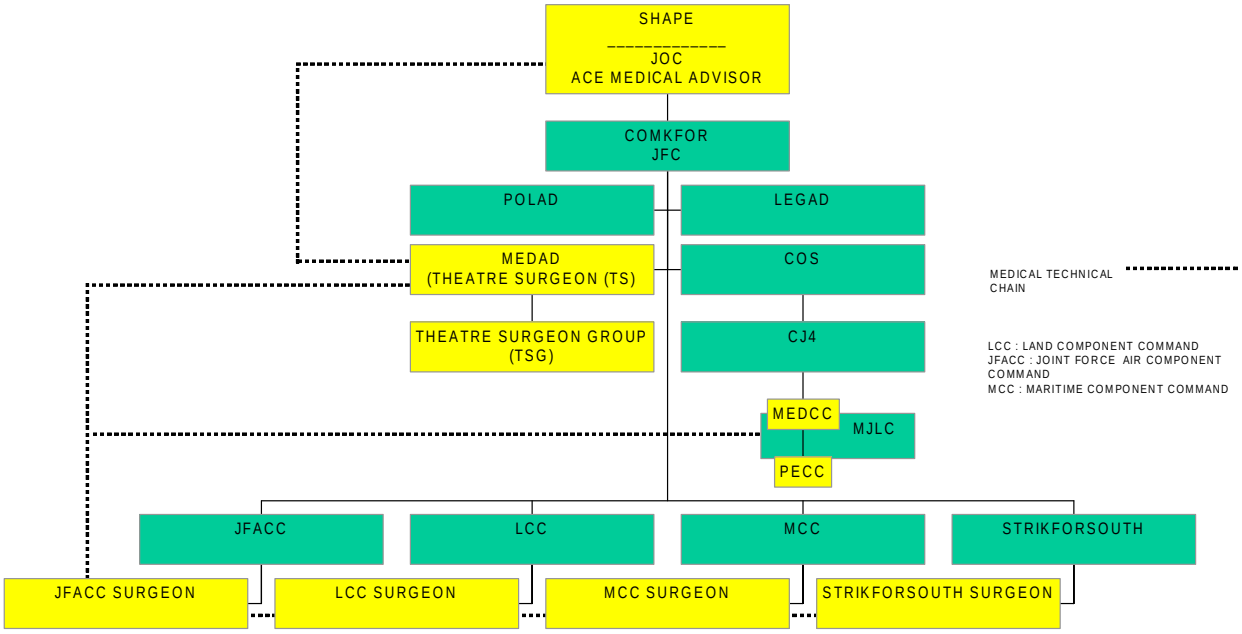
Medical C2 Structure in a Joint Environment

The medical C2 structure in a joint environment is based on the latest guidance provided by MC 326/1, AJP-4.10 and AJP-4.6. In principle, the technical medical chain extends from the SCs Medical Advisor through the Theatre Surgeons, to the Component Surgeons and all medical assets in the Theatre Area of Operations (TAOO). At every level, the Medical Advisor must have direct access to the commander. The Theatre Surgeons and the Component Surgeons will be located at their respective HQs.

During operations, the Medical Advisor of the HQ providing the HQ staff for the Combined Joint Task Force (CJTF) will normally serve as the Theatre Surgeon (TS). He is aligned at the advisory level in the CJTF HQs with an appropriate staff element, the Theatre Surgeon Group (TSG). He is also responsible for setting medical policy for the theatre, co-ordination of intra-theatre medical resources, and provision of joint medical guidance through liaison with multinational component command surgeons. The TS will co-ordinate all medical force-protection related actions (preventive medicine, medical intelligence, epidemiological and environmental survey, hygiene and sanitation, veterinary services). The TS will also

establish an overall MASCAL plan, in co-ordination with other HQ staffs and provide medical NBC advice. He directs the preparation and maintenance of a summary of the medical support capabilities in the theatre and other relevant medical information for theatre-wide dissemination like the theatre medical handbook for instance. Finally, he co-ordinates with and supports civil-military co-ordination (CIMIC) staffs in the area of public health and humanitarian assistance throughout the theatre. The staff of the TS expands through national augmentees from a nucleus to a full establishment, able to address the whole spectrum of medical issues.

While in the mature theatre of SFOR the Theatre Surgeon and Theatre Surgeon Group function have consequently evolved into specific CJMED posts, I show you here as an example, the medical command structure at a certain stage accepted by the nations during the KFOR and AFOR planning.



It illustrates how both, the Theatre Surgeon position and the Theatre Surgeon Group, are well positioned in order to ensure adequate medical control and co-ordinating capability. The MEDCC and its PECC remain under the MJLC and the J4, both as executive bodies of the theatre medical policy and its overall guidance.

On the other hand, the MEDCC is the executing body of the medical organisation for all CJTF operations. The aeromedical evacuation (AE) works under the technical direction of the TS and co-ordinates multinational joint and combined issues. As mentioned before, the MEDCC will normally be placed in the Multinational Joint Logistic Centre (MJLC).
When an MJLC is not formed, the MEDCC will be part of the J 4 staff. The MEDCC is designed as a modular structure that encompasses two cells, the Medical OPS/Plans Cell and the Patient Evacuation Co-ordination Centre (PECC).

The main function of the MEDCC is the execution of medical plans and the implementation of medical policies set by the TS. It co-ordinates implementation and execution of the full spectrum of medical and health plans between all components of the CJTF. The function of the OPS/Plans Cell is to co-ordinate current medical operations and to develop medical support planning for future medical operations as directed by the MEDCC Chief. It develops and updates the theatre-level MASCAL plan and co-operates with the PECC in case of its execution. It provides the expertise required to implement the preventive medicine and environmental policies directed by the TS. The OPS/Plan Cell co-ordinates the activities of the “environmental health team”. During a CJTF mission there will generally be the need for qualified personnel to assess the health risk and to provide preventive and environmental medicine support. The PECC provides the theatre level medical evacuation and regulating functions for all patients, moving beyond formation boundaries, in conjunction with force components and theatre logistic and movement control agencies. It is responsible for patient tracking and the maintenance of the medical facility capability database. The PECC must have its own dedicated communication links to the key nodes of the evacuation system. Should a MASCAL situation arise, then the PECC will implement the TSs decisions and act as the interface between the TS and the units involved in the MASCAL.

Medical Support Principles and Policies

The next part of this paper will address some of the most significant "Medical Support Principles and Policies" for multinational medical operations. These principles and Policies are formulated in MC 326/1, which was approved in June 1999 by the Military Committee. AJP-4.10, the "Allied Joint Medical Support Doctrine", will provide the respective doctrine based on MC 326/1. The ratification draft of AJP-4.10 has been forwarded to the nations in March 2000.

Standards of care: "Operational medical support to NATO forces should meet standards acceptable to all participating nations. Even in crisis or conflict, the aim is to provide a standard of medical care as close as possible to prevailing peacetime medical standards." This support principle is a relatively new approach for the modern medical services and one of the main drivers for a certain number of medical requirements and force proposals for the year 2000. The achievement of this aim requires high standards of technical skill, equipment and medical supplies at the right time and in the right place.

Continuity of care: A patient passing through the military medical system from the point of wounding to the definitive care must be given continuous, relevant and progressive care. In-transit care must be provided during evacuation and the clinical condition of the individual is the key factor governing the timing and means of the patient's evacuation. The principle of continuity of care refers essentially to two fundamental aspects of military medical support on the battlefield: the initial surgery and the evacuation.

The military surgical care system depends upon an organised pre-hospital treatment and medical evacuation system. It utilises somewhat differently and successively staged techniques to treat the injuries on the battlefield. Initial surgery, if necessary, renders the casualty transportable via rapid evacuation to a rear hospital for more intensive treatment. This means that several different surgeons in different medical facilities with different and generally increasing medical capabilities care for the individual who has been wounded in combat. This concept of casualty management allows forward medical facilities to be more mobile. It concentrates more resource-intensive casualty care far to the rear in secure areas where medical facilities are not required to move following changing tactical situations.

Fitness for evacuation: The clinical condition of the patient will govern the priority, timing, means and destination of evacuation. This is the reason why the co-ordination by medical regulating staff is required. And here we see the rationale for the role of the PECC (Patient Evacuation Co-ordination Centre) as part of the new CJTF-MJLC concept.

Time: Time is a critical factor in patient survival and recovery. Hence, time is the major driver dictating the type and location of medical assets. Timelines in providing emergency care and emergency surgery to the wounded is indeed crucial.

Future Developments and ongoing Challenges for the Medical Support in NATO

The overall idea for future developments is to stress the multinational approach in order to save costs and optimise capabilities. Lead nation approach and role specialist nation (RSN) arrangements can be the solution, if all participating nations agree. However, the Multinational Integrated Medical Support Unit (MIMU) Concept should not be excluded for the future. For the first time we are offering this possibility to the SFOR Follow on Forces (FOF) in order to take advantage of economies of scale. Indeed we encourage the establishment of medical facilities composed by different national modules. The nucleus and the command structure of the MIMU will be provided by a single nation, supplemented/augmented with capabilities, assets, services by other nations.

Within the Defence Capabilities Initiative (DCI) medical issues are addressed under the DCI Code SL 5b.

Taking into account the aim to create the bases of a responsive, coherent medical support structure at the level of a generic joint multinational Force, in which national force contingents and their incorporated national medical support elements can seamlessly be fitted in, the Committee of the Chiefs of Military Medical Services in NATO (COMEDS) recently approved the following medical sub-tasks in support of the DCI decision SL 5b:

- Nations and SCs should improve the quality of care and medical support.
- The general medical planning process must be improved.
- Medical force planning and generation must be improved.
- Current doctrine regarding Medical C2 must be implemented in all operations.
- Medical doctrine and procedures aiming at increasing multinational integration need to be further developed.

Subsequently COMEDS developed at its 2000 spring plenary meeting in Athens an action plan to continue the necessary work on DCI decision SL 5B. Beside several other requirements addressed to all COMEDS plenary members or COMEDS working groups, the following actions, which focus on multinational medical support, were formulated for the Strategic Commands (SC) to be the main action body with the assistance of the nations:

- Develop and publish the Multinational Medical Evaluation and Assessment Program (MMEA), which is the medical correlate of the Logistics Evaluation and Assessment Program (LEAP). It will provide a mechanism by which the medical support offered to an operation by NON-NATO Troop Contributing Nations can be evaluated for sufficiency, adequacy and quality.
- Develop a Medical Information Management System (MIMS), which can be used by all nations in a multinational operation and then begin the actual development of MIMS including integration with other information systems.
- Amend and broaden the ACE Medical Support Principles, Policies and Planing Parameters (AD 85-8) into as Bi-SC document for complete operational planning. AD 85-8, which is an excellent document for Article 5 medical planning, requires progression towards a tool being also usable for Crisis Response Operations (CRO).
- Write and publish a concept plan or functional planning guide for establishing a Multinational Integrated Medical Unit (MIMU). A well functioning MIMU exist today at SIPOVO in the SFOR theatre. MC 326/1 and AJP-4.10 authorises MIMUs as alternative mechanisms for the provision of health care in the field. There is a need for a compendium, which would provide a synopsis of lessons learned and guidance as to how to effectively establish a MIMU. It is the purpose of this seminar to discuss this and to provide assistance in this action. Develop and integrate the medical portion of the Host Nation Support (HNS) capabilities' catalogue. The SCs and the Senior NATO Logisticians Conference (SNLC) are currently developing this catalogue. It is necessary to ensure that the medical contributions, which may be available from each nation, are catalogued and made available for planning purposes.
- Ensure medical requirements are included in the respective Capability Packages (CP). These CPs are to provide infrastructure (e. g. Communication, vehicles) to the Multinational Joint Logistics Centre (MJLC). It is incumbent upon COMEDS to ensure that all medical requirements are included in these CPs.

Flexibility is the Key to Airpower
Medical Power is the Key to Operations Success:
Lessons Learned from Flying Operations over the Balkans

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SUMMARY

This paper presents a brief overview of the European situation as described during the Summit Meeting of the Head of States in Washington, April 1999.
The requirements for adequate Health Care Management from a military operational standpoint will be reviewed. The preparation and training, the situation in combat operations as well as after action care for airmen will be described, along with a discussion of lessons learned from recent military operations with special emphasis on the German view.

Introduction
During the Summit meeting of the Heads of State in April 1999 NATO responded to the fundamental and dramatic changes in the Euro-Atlantic landscape by proclaiming the Alliance's new Strategic Concept.
In the introduction of the Alliance's Concept they stated as a sumup: **"Although we have experienced an improving security situation within the Euro-Atlantic area, we do have to be aware of security challenges and risks that still may arise to anyone of us."**
Furthermore they stated in Part II: **"These military or non-military risks may be multidirectional and often difficult to predict."**

What does this mean for military leaders? It simplified means, that the call for military missions may arise adhoc and may lead into military operations at a non predictable scale and upfront at unknown locations. Airforces therefore have to provide suitable and credible military means to the politicians for conflict prevention and crisis management.

Due to the characteristics of airforces - particularly flexibility, which could be assessed as the key to airpower - they take on a special role in crisis management once it comes to military operations. They have the inherent capability to rapidly contribute to escalating or deescalating a crisis situation by fast deployment and dedicated concentration of versatile forces; this is unique and clearly distinct from any other military means in the political process of crisis management.
Due to this very unique capability most of the airforces are kept at a high readiness state and represent a very powerful and sensitive political instrument. Airforces provide the opportunity to engage effectively in a conflict without exposing a larger number of troops / of soldiers into the range of weapons of an opponent or conflict adversary.
No matter what crisis situation of the recent past we take a look at. It was always to the airforces to be the service of the first hours. Examples are: Operation DESERT STORM where airforces of the alliance conducted the initial combat missions or the KOSOVO-crisis or the Chechnya-conflict. The first and early missions were always to the airforces.

In case of an engagement after governmental approval, the military leaders will give the final execution order for combat operations. This circumstance puts them into a very distinguished responsibility to the warfighters and to the public media.
What does **this** distinguished responsibility include? – On the one hand it calls for well equipped smart weapon systems on a high maintenance level, and on the other hand it especially demands highly trained, stressresistant and healthy people able and capable to deal with all types of challenges during various phases of military operations.

It is the military leaders responsibility to ensure that the warfighter is being brought into the condition that he or she is able to cope with the demand and to perform with a sufficient level / probability of success and survivability in a complex hostile environment so as to meet the challenges of combat operations of nowadays and in future. The realization of proposals and goals derived from this needs are to be fully in line with the Geneva Convention.

Paper presented at the RTO HFM Specialists' Meeting on "The Impact of NATO/Multinational Military Missions on Health Care Management", held in Kiev, Ukraine, 4-6 September 2000, and published in RTO MP-068.

Mission effectiveness and survivability

Of utmost importance for combat effectiveness is good Health Care Management. This includes adequate medical capabilities and installations, but even more important is adequate care for the human being itself and his human rights
What does Health Care and Medical Power mean? The frame of Health Care and Medical Power is much more than physical treatments and physical therapy. It includes the psychological aspect in a most prominent position.

Both **physiology and psychology** are two equal pillars for a balanced, strong, resistant and healthy human being, able to perform his mission under all circumstances of military operations and during all possible phases of crisis management.
If one pillar of the selfstabilizing dynamic system is weakened beyond an acceptable limit, the risk of a loss of stability increases, thus evolving the danger that the task or mission will not be fulfilled adequately.

To understand the complexity of this issue it is important in a first step to identify the fundamental areas / the parts / the pillars of a very simplified model of soldiers as human beings.
The second step is to identify the **requirements and challenges**, or better described as the operational baseline, that warfighters / aircrews must achieve, such as stress resistance and physical condition.

The challenges that will have to be met in today's environment are really demanding. So military leaders have to focus on these aspects and areas which could support the endeavor necessary to achieve the aims in the most efficient way.

The proposals are most similar: - All of the efforts must be aimed to provide a most stress resistant and healthy warfighter, ready, well trained and highly motivated when it comes to combat operations.

Preparation / training

As a first step, let us take a look at the preparation / training phase, again regarding the physical and the psychological pillar.
The aim of the effort, spoken in physical terms of reference, is to achieve and maintain a certain level of physical fitness. The question is "HOW ?" – Physical fitness is achieved by adequate training and exercising. The catchword is: Train as you fight! - If you exercise your body, you will expose it to demanding efforts and you will have to give it the chance for recreation as well.
All personnel, especially aircrews, are aware about the importance of **physical fitness** when the time for regular checkups has come. This certainly applies to a soldier on the ground and an aircrew as well.

So it is not only important to the warfighter in theatre or in conduct of a mission but also to all military personnel to have medical installations like hospitals, recreation facilities with well trained, professional medical personnel and equipment available to conduct reliable medical checkups and sound medical treatments to attain and maintain physical fitness and health.

The words of the famous roman poet **JUVENAL „mens sana in corpore sano"** have proofed to be true and relevant for hundreds of years.

The **psychological pillar**.
As a fundamental prerequisite, psychological stability has to be aimed for, achieved and conserved during the preparation phase as well. This is much more complex than it seems to be. The areas described may not be comprehensive, but they will point out the dimensions which will have to be taken into consideration when talking about psychological stability.

First of all the **confidence** into own skills, capabilities and limits as the result of training and physical fitness has to be built and regularly strengthened. This is fully in line with the confidence into the effectiveness of own weapon systems and equipment, which is a basic precondition for a warfighters morale.
If on the contrary, equipment obviously does not meet the requirements of modern warfighting, motivation will be diminished, success of training be degraded or even negated and mission effectiveness be tremendously at risk.

The warfighter needs to be provided with sufficient confidence that all operations are and will be conducted in accordance with moral and ethic principles of UN Charta and will be supported by government and public. The justification of a possible engagement must be supported by a broad public, otherwise it will cause individual doubts.

But there are some other, much more **personnel concerns**, concerns of social provision that have to be taken into consideration. Questions for example like: What happens to me and my family, if I get killed or crippled? – The answer to this question well may influence the individual performance if they remain unsolved or not answered.

To assess the individual psychological situation a trustful relationship to a psychologist or a trusted agent has to be established, an experienced person who is aware of the specific circumstances and aspects of military life and fully understands the unique situation and the individual problems of soldiers and warfighters.

The psychological pillar is very complex and demanding in its structure and content.
At this point it is quite important to comprehend the various influences that form the basis for a mission success or a mission fail. It is judged to be the basic rationale for dedicated medical health service in peace and war.

Combat Operations

Maintaining a high level of **physical fitness** during combat operations and individual missions is the most demanding challenge to medical health care management.

In combat aircrews will be exposed to extraordinary physical and mental loads for hours. As an example, the German ECR-Tornado crews got cockpit times of up to eight hours. Being submitted to such circumstances under extreme adverse conditions might easily exhaust aircrews as well, thus approaching **physical and mental limits** in respect to flight-safety.
Consequently, in parallel to best available combat equipment, for compensation sufficient leisure time has to be made available for physical recreation in combination with a variety of exercising opportunities.

This is longing for a close supervision by doctors to track the actual physical condition of any aircrew, to give recommendation to military leaders, whether to task that specific aircrew or not. Close cooperation between the doctors and military leaders and a high level of confidence and confidentiality is of utmost importance.

To enhance the performance of any individual medication as well as nutrition has to be taken into consideration. This means for example that nutrition has to be adapted to geophysical conditions under consideration of individual requirements. The medical advice for a balanced nutrition is essential.

But what if something mishappens? – How do we recover an injured downed aircrew? - Medevac in combination with Combat Search and Rescue has to be available at all times during ongoing operations. Preplanning and credibility of those operations is absolutely mandatory. After the initial rescue and first-aid treatment, follow-up treatment has to be ensured.
This calls for highly flexible operational assets in combination with well equipped and well trained medical personnel.

Lets take a look at the process that takes place in an aircrews mind.
In addition to the items that are relevant during preparation / training phase some more factors are to also relevant, due to the fact that the danger for life is imminent during combat operations and aircrews are aware of this; so they need to deal with it in a conscious manner.

Naturally the aircrew is highly interested in such vital affairs or questions as:

- Will I get killed or injured?
- What kind of treatment can I rely on in case of any mishap?
- Who takes care of me and my family if something will go wrong?
- Will I be able to handle that mission?
- If I fail, will I get rescued? - Recall the pictures of that US soldier, who was downed and dragged through the streets of Mogadishu / Somalia and imagine how this could influence the mental stability in terms of fear and motivation.

Besides the first one, these questions better be answered before. If they remain open, they will work subconsciously and the aircrew will only have limited mental capacity or restricted concentration available to conduct the mission.

Additionally, the tremendous stress load an aircrew encounters in combat mission does not only have a physical but also a mental dimension. Thus, any increase of mental stress has to be avoided or at least reduced to the absolute minimum.

A mental overload may cause in worst case the loss of an aircrew. Every precautionary measure has to be taken to keep it under control or in other words: “Defend the COMBAT FATIGUE SYNDROME.”

The military leader has to get the information that an aircrew suffers from this syndrome prior to the tasking. That means a close and trustful relation to the aircrew has to be established either directly or via a third person who has himself established a trustful relation to the aircrew. That might be a psychologist, a buddy-aircrew or anybody else.
If an aircrew encounters the combat fatigue syndrome, he needs to get professional help from a psychologist, who is able to restore the mental constitution within a short period of time.

But one thing is much more important: If this situation is encountered something must have gone wrong before. Perhaps that person did not have the chance to fully clarify the questions in regard to his family, or he was not provided adequate training or he did not have the chance to adequately recreate.
A highly demanding mental impact that can happen is the Traumatic Stress Disorder, a symptom that always may arise during combat operations for many different reasons.
The military leaders need to concentrate on the successful conduct of the campaign and this could rather absorb their attention. Therefore they need professional support by medical and / or physiological health care specialists, available in theatre and directly to be involved as necessary.

After action

Once combat operations have been terminated military leaders are obliged to think about and prepare reestablishing the physical constitution of the aircrews / warfighters. There is a need to have medical facilities, such as hospitals, health resorts and recreational facilities but first of all, but there is also a need for experienced and well trained medical experts to conduct the necessary after action measures.

For injuries such as Post Traumatic Stress Symptom or Disorder and Combat Fatigue Syndrome psychological support to reestablish normal living conditions has to be provided.

That simplified are the demands to after action healthcare. In fact it is a long lasting process and in certain cases a most complex one. Therefore it is crucial that military leaders and their medical advisors have to take this into consideration at the earliest point of time and ensure arrangements suitable to cope for sufficient accompany and if necessary for adequate medical treatment over the period of time required.

Provisional Sumup

I tried to analyze the special demands that military missions, flying operations pose to medical support of aircrews during the three main phases of operations.
I have pointed out, that on the one hand medical support functions and capabilities such as MEDEVAC, hospitals, surgery etc. do have tremendous influence on the psychological constitution of an individual airman, although the factors solemnly seem to be responsible for physiological care.
I delineated that a good physiological fitness in connection with confidence into own skills and capabilities is essential to support a strong psychological constitution.
I underlined that besides general medical healthcare aspects also social environment and personal aspects contribute to the psychological constitution of a soldier and airman. In consequence, successful mission accomplishment particularly requires precautionary measures to avoid or at least reduce stress increasing factors.

Discussion and assessment of lessons learned from recent operations/activities

What are the experiences gained from flying operations over the Balkans.

As the situation in former Yugoslavia escalated and it became obvious that military operations would have to be taken to preserve respectively restore peace and stability within the Euro-Atlantic region, the preparation phase of earmarked or NATO-assigned troops began.

During all the preliminary phases it was noted that the physical condition of the aircrews was excellent, thus providing a sound basis for planning, preparing and ultimately executing the mission effectively. This was especially due to the fact, that military leaders could fully rely on a well functioning, highly professional medical health care system which supported all activities in a dedicated way and thus guaranteed success throughout the campaign at any times.
This was the solid and at the end successful result of a long-lasting medical process of general health care and checkups together with self-discipline of the aircrews.

A very important role in this process came to the flight surgeon within the wing. He has been even more than a well known person to the aircrews. He is one of them, or in other words the trusted agent for most of the aircrews and additionally a well proven mediator in some critical situations with reliance to physical and mental conditions. One lesson learned out of it was, the concept of flight surgery proofed to be perfectly right and excluded avoidable limiting factors to a large scale.

Another major area of interest was to strengthen the psychological pillar. Particularly, this was emphasized due to the fact that for the first time since World War II the Luftwaffe was to be engaged in hot combat missions.
All preparatory activities had to be regarded against this very special background and dedicated precautionary measures deemed to be mandatory.

On the verge of the war the training of the aircrews was intensified. They for example got courses in stress management and survival procedures. They were prepared that life at home most probably would change during their absence and they were provided advice in order to deal with the fact that their family would develop towards an increased level of independence.
The wing implemented a family care center as an installation to inform, to help and to provide assistance to the families at home. Points of contact were established to practically support the families or single persons left back. The frame of supportive work enclosed a broad spectrum of assistance, ranging from help in official affairs up to plumbers job as well.

A priest and a psychologist's service was established. During regular meetings they also established and maintained a close contact to the families. They were available and responsive to provide spiritual or mental support at all times, if required.
This turned out to be most beneficial at least for maintaining or even increasing the morale of the aircrews, because they were granted a sound feeling that their families received the support they needed.
Thus a main potential stress factor was removed from the aircrews.

As expected, the media were highly interested in gathering informations about the aircrews and their families. Providing official information while preserving privacy of the aircrews and their families became a challenge to the wing. And as the challenge was increased privacy could only be preserved by really coordinated and concentrated efforts. Following this approach it could be also achieved that the aircrews got the knowledge / the feeling of being taken care of by an institution like the Luftwaffe. Undoubtedly, this in addition was essential for final mission success. In the end a mandatory sound and supportive social environment could be provided continuously and turned out to be most fruitful.

At the deployed operating base a medical component, enforced by a priest and psychologist, was established. Their task was to supervise and to strengthen the psychological condition of the aircrews and –if necessary- to give a warning hint to the military leaders before a critical situation fully evolved or became apparent.
In the beginning aircrews tended to be reluctant in getting into contact with or even consulting the psychologist on a voluntary basis. However, as soon as they recognized and got the experience that it might be at least helpful to talk to somebody in privacy about personal problems and to feel the relief after such a conversation, the situation changed completely and full acceptance arose towards this institution.
In the Luftwaffe a psychologist who shared the activities of the wing on a regular basis is assigned to each wing in order to establish and to develop a sound and trustful relationship with the aircrews.

Fortunately, German Airforce crews were not forced to be rescued during combat action and gracefully, none of the aircrews was physically injured. Nevertheless, they were prepared for such situations, so far mainly relying on our alliance partner's capabilities in Combat Search and Rescue.

Trustful psychological care is of high value for morale and consequently for combat readiness and it is an indispensable complement to physical health care.

Final conclusion

The success of the flying operations over the Balkans is not only a result of military operations at its own. To a large scale, it also is the result of a long-lasting and ongoing process of health care management as well. Health care with medical capabilities to provide both, individual psychological strength and physiological stability.
This contribution cannot be over-estimated and deserves high recognition by military leaders during all phases of a campaign.

Military operations need to be accompanied throughout all phases by adequate and dedicated health care provisions and measures. From preparation phase up to and including after action activities.
Military leaders are responsible for our aircrews / warfighters upon entering service. They do have to provide best equipment, training and provision for efficient mission execution. But this is only one side of the coin, which needs to be regarded in a non-separable unity with the second one called “care”.

Medical health care is a mandatory prerequisite, which needs to be visible, efficient and credible to the individual soldier, and it requires to be trustworthy and confidential in handling personal matters as well.
Only if we can achieve full implementation of these aims, then we will have a realistic chance to get a warfighter who is not only able to meet the technical challenges of modern warfighting, but who also is capable and has the necessary morale to execute his mission with a high degree of success and survivability.
This finally leads to the assessment that medical power becomes or already is a key to operations success.

Rational Distribution and Use of Military-Medical Resources.

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The support of resources, including assessment of needs, the structure of the acquisition system, and the distribution and utilization of medical goods are among the most urgent problems of the military health care in Ukraine. The often ineffective performance of the military-medical service is due to the rigid, inflexible health resources system. A second negative factor is the irrational distribution of the limited resources, particular of the funds for the treatment of patients. The discrepancies can be explained by the high disease incident rates among military personnel. A third negative factor is the inadequate system of military-medical system financing, which does not allow the commanders to spend money on measures promoting the health of personnel.

The paper describes the scope and essence of the current reform of distribution system and of the use of medical resources in the Ukraine Armed Forces. We will try to answer the following questions:

1. How can the leadership of the military-medical service develop strategies for a more rational distribution and utilization of military-medical resources?

2. What role do the managerial bodies of the military-medical system play in undertaking the reform of the health resource system?

The construction and development program of the Ukraine Armed Forces is based on the following premises:

- autonomy of the distribution and utilization of medical resources;
- division of the management into two branches: administrative and operative;
- combination of the management and the medical activities in the military-medical establishments (military hospital, military-medical center);
- decentralization of budget responsibilities and modification of the military-medical finance system.

As the primary step in the reform program was the development of a classification system for the distribution of the military-medical resources distribution in the Ukraine Armed Forces. Two basic types of resources can be distinguished:

Category A is funding is intended to maintain the professional health of military personnel through: (a) the maintenance of occupational health; (b) providing spiritual and social-economic comfort as well as professional motivation; (c) prevention of acute, cumulative and remote occupational pathology; (d) installment of a sufficient level of functional reserves.

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Category B funding is intended to provide accessible, modern and high quality medical care corresponding to the national standard. There are three subcategories of funding:

(a) medical support of military personnel;

(b) medical care for retired personnel of the Ministry of Defense;

(c) medical care to the families of military personnel.

The distribution of the military medical budget expenses is shown in table 1.

Table 1.

Type of expense	Target	Budget source
Medical examination of conscripts	**Quality selection of health personnel**	**Ministry of Defense (MOD)**
Protection from hazardous factors of military work	**Medical measures to maintain servicemen health and working capability**	**MOD**
Temporary loss of working capability	**Medical treatment and rehabilitation**	**Ministry of social protection, MOD**
Retired aged servicemen	**Free medical care**	**MOD, Ministry of Health (MOH)**
Servicemen families benefits	**Free medical care**	**MOH, MOD**

There can be no doubt that the management responsible for health resourcing should consider the distribution of responsibilities between the commander, the medical service and the military medical personnel. The medical service can only be made responsible for medical preventive measures, diagnostics and the treatment of diseases and traumas. A key problem in the development of the new model of the military medical system is how to define mechanisms which will help to shift from a deficiency to a priority principle in financing. We are convinced that such a mechanism could be a social contract between the law-making and executive powers, and the citizens, which complies with the State standards for professional health and medical care. The standard of professional health, as approved by the legislative body, would then become the criterion for combat readiness of the Armed Forces in terms of human factors, and the standard of medical care would guarantee each citizen of the country adequate medical care and legal protection of his /her right in court.

To achieve a rational distribution and use of the military-medical resources, the following measures should be taken:

- to align the number of treatment facilities, their staff and supply the available budget;
- to implement a progressively layered territorial system of medical treatment and care;

- to promote setting up military-medical facilities which provide paid medical service to the population;

- to organize a flexible and cost effective system of medical supply, which combines centralized and decentralized principles for the acquisition of medical equipment, means and pharmaceuticals.

The general principles, requirements and standards of professional health and the medical support system of the Armed Forces for any kind of their activity, should be regulated by a medical law. If this is approved, the State standards will become the basic principle which will determine the necessary amount of military-medical resources and the distribution principles.

A significant aspect of the development of the new model of the military-medical system is the organizational innovation, which includes a revision of the supervisional role of the command body of the military-medical service in providing a rational distribution of health resources.

What did we manage to do?

- we combined outpatient and inpatient clinics in single treatment facilities, which allows for a more rational use of medical personnel and equipment;

- we have implemented flexible norms for diagnostic and curative procedures, and for the planning of the use of resources;

- we have established military-medical centers where three levels of medical care function under a single leadership;

- we have implemented medico-economical standards for patient examination.

- we have introduced strict guidelines for hospital admission and discharge, and have implemented pharmacological forms for all types of medical care.

We suggest that a complete success of the planned program is only possible when the Ukraine health protection system is reorganized as a whole. However, is outside the competence the of military-medical service.

These reorganizations are primarily directed at establishing an independent structure for the professional management of military medical support and for the decentralization of the military medical service.

It is the time now to approve the new status of the military-medical system as a separate service of the Armed Service with its own staff policy, managerial structure, finance, medical and material supply.

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Pre-Deployment Medical Readiness Preparation

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SUMMARY:

With emphasise on medical readiness preparation for the deployment of forces to a NATO/Multinational Military Mission, the paper will cover the following topics:

- NATO Medical Support Principles and Policies
- Medical Operational Principles
- Allied Joint Medical Support Doctrine
- Crucial Aspects of the Most Likely Types of Current and Future Operations (Medical)
- Force Protection, Medical Force Protection and Medical Force Protection Assessment
- Life-Cycle Medical Surveillance for Operational Deployment
- Pre-Deployment Medical Readiness Preparation and Baseline Assessment

DISCUSSION:

NATO Medical Support Principles and Policies

The Alliance's New Strategic Concept, the Military Committee (MC) Directive for Military Implementation of the Alliance's Strategic Concept, NATO Force Structures and NATO's Concept of Reinforcement, all have implications for the Medical Support of Alliance Forces. The "NATO Principles and Policies for Logistics" stated that "General logistics policies apply in most measures to the medical support function. However medical support guidance must be governed in addition by specific medical factors". Consequently, "Medical Support Precepts and Guidance for NATO" was approved by the Military Committee on 15 Jan 93 and issued as MC 326. Based upon lessons learned in exercises and operations since the issue of MC 326, and to ensure consistency with the revised "NATO Principles and Policies for Logistics", the Committee of the Chiefs of Military Medical Services in NATO (COMEDS) directed the expansion and updating of MC 326 to provide guidance on medical support concepts for NATO and National Authorities. The document has been renamed "NATO Medical Support Principles and Policies" to bring it into accord with the "NATO Principles and Policies for Logistics". In June 1999 the MC approved and published the new MC 326/1. The purpose of this document is to expand on MC 326 and, taking into account the developments of modern medicine, to set forth the principles and policies for medical support to allied military forces in operations, and to give guidance on medical support concepts to NATO and national authorities so that they may develop compatible medical support concepts, plans, structures and procedures. It addresses only the operational aspects of medical support and excludes the clinical aspects of medical care. The principles and policies set out in this document apply in peace, crisis and conflict, and include Article 5 Operations as well as non-Article 5 operations. They also apply to operations within the framework of the Combined Joint Task Force concept and for non-NATO nations in NATO-led operations.

Medical Operational Principles

Within the enumeration of principles of medical support, which relate to operational support from the NATO policy level to the planning constraints levels, some principles concerning medical readiness preparation are listed in MC 326/1 as follows:

- **Readiness and Flexibility.** Medical units and staff must be at the same state of readiness and availability as the force they support with the flexibility to meet the demands of evolving operational scenarios.

Paper presented at the RTO HFM Specialists' Meeting on "The Impact of NATO/Multinational Military Missions on Health Care Management", held in Kiev, Ukraine, 4-6 September 2000, and published in RTO MP-068.

- **Transition from Peace to Crisis or Conflict.** The medical support in crisis and conflict must originate from peacetime military healthcare systems by a progressive reinforcement. Medical readiness and availability must be sufficient to allow for the smooth transition from peacetime to crisis or conflict posture.
- **Medical Materiel Readiness and Sustainability.** Levels and distribution of medical materiel must be sufficient to achieve and maintain designated levels of readiness, sustainability and mobility to provide the required military capability during peace, crisis and conflict.

The intricate nature of NATO and other multinational operations and the principles, which govern them, are obvious and this applies to the respective health care management, too. The determinants are further complicated by financial and resource limitations and by the reaction time of a highly complex political decision cycle. Comprehensive medical plans and a high state of readiness with respect to resources are essential to permit a rapid, efficient and flexible response and to provide a medical support capability that must be complete, coherent and present from the earliest phase of any operation.

Allied Joint Medical Support Doctrine

Based on the NATO Medical Support Principles and Policies laid down in MC 326/1 and the experiences gained from Bosnia, during NATO's first land force deployment, work continued to further develop the Alliance's medical support doctrine. This happened and is still carried out within the preparation of a series of Allied Joint Operational Doctrine and Allied Joint Logistics Doctrine. In March this year the ratification draft to the "Allied Joint Medical Support Doctrine" (AJP-4.10) was distributed to the NATO Nations. The document responds to newly agreed NATO policies and principles, the reality of nations' changing force structures, and NATO's expanding operational interests. The aim of that publication is to provide medical support doctrine for NATO multinational joint operations and essential material for medical planning staffs. It forms a doctrinal bridge between medical support principles and policies included and planning guidelines. The medical support doctrine allows considerable flexibility. It does not reflect nor exclude any particular nation's approach to medical support. The doctrinal framework is focused on "how to think" rather than "what to think" and does not preclude close co-operation between the nations, even if some differences in national doctrines exist. Hence different options for co-operation in medical support are offered to be tailored on a case by case basis. The document provides a detailed overview of the interactions between medical and other staffs. The statement that "in NATO, Medical is part of Logistics" is true but incomplete. It poorly reflects the span of collaboration and interactions across the entire spectrum of the command staff elements that is required from the medical staffs in operations. In fact medical staffs operate in a highly specialised and multifaceted environment, which involves linkages and interface with all key NATO commander staffs, of which logistics is only one part.

Crucial Aspects of the Most Likely Types of Current and Future Operations (Medical)

Presently, smaller, more localised, operations such as peace keeping, peace support or crisis response are probably going to be the most common operations for NATO and/or other multinational formations in the short and medium term.
From the medical viewpoint, crucial aspects of the most likely types of current and future operations are:

- Joint operations
- Combined (or multinational) staffs and force structures
- High degree of flexibility and mobility
- Variable and low average casualty rates
- Emphasis on medical support as close as possible to national peacetime standards
- Emphasis on force protection at all levels, to assess medical support readiness, share lessons learned and good ideas, and identify issues for command awareness
- Emphasis on environmental hazards leading to the need for preventive medicine based on accurate health information
- High level of media coverage leading to more public focus on the need for adequate medical support and more influence on morale of troops and public support
- Requirement to support humanitarian emergency situations together with International Organisations, Governmental and Non-Governmental Organisations (NGOs)

Force Protection, Medical Force Protection and Medical Force Protection Assessment

Within the framework of medical support and health care management as regards NATO /multinational military missions, now, I would like to focus on the aspect of pre-deployment medical readiness preparation.

Force protection may be defined as the protection of personnel, facilities, and equipment in all locations and situations.
Three primary focus areas for force protection programmes established by NATO commanders, and incumbent upon all contributing nations for proactive collaboration, include the following:

- Physical and Operational Security:
- Guarding personnel and material against hostile intent.
- Safety:
- Protecting individuals against injuries from inappropriate procedures and inattention.
- Health:
- Protecting individuals against the physical environment and disease.

In a medical context, force protection is the conservation of the fighting potential of a force so that it is healthy, fully combat capable, and can be applied at the decisive time and place. It consists of actions taken to counter the debilitating effects of environment, disease, and selected special weapon systems through preventive measures for personnel, systems, and operational formations.

Medical force protection programmes will cover the following key tasks:

- An assessment of the adequacy and readiness status of the medical support structure to provide required medical services.
- Education and training campaigns to protect and promote the health of the troops.
- The promotion of what works well across the entire force.
- The identification and working towards resolution of critical issues and shortfalls.

The medical force protection assessment focuses on the readiness of the medical support structure to prevent and respond to personnel injuries and illnesses (i.e. organisational and planning readiness). Major categories of criteria for conducting this assessment include Standardisation and Operational Plans.
Medical support capabilities, which may serve as qualitative items for assessment, include:

- Air, maritime and ground evacuation capabilities
- Emergency surgery and treatment capabilities
- Epidemiological surveillance and medical reporting functions
- Medical information collection and intelligence functions
- Preventive and veterinary services functions
- Preventive and health education for deployed troops
- Overall medical planning functions
- Medical support to Non-NATO personnel and humanitarian assistance

The conduct of deployed force exercises requires also assessment functions to be performed to key aspects of medical support. Assessment criteria utilised for this function may focus on a range of both organisational, resource, and performance characteristics of the medical support structure, for the exercise and training forces, and for home based units supporting insertion of exercise forces.

Life-Cycle Medical Surveillance for Operational Deployment

Military personnel deploying to various regions around the world may encounter significant infectious disease, operationally based and environmental health risks. Disease and Non-Battle Injuries are potentially a greater threat than Battle Casualties are to the effectiveness of operational units and the success of the overall mission. Life-cycle medical surveillance, prior to, during, and post deployment, must be an command priority for both effectively achieving the mission, and concerning the health and welfare of all deployed personnel. Personnel must deploy fit and healthy, maintain this readiness state during the operation, and then be harmonised back into their post deployment family and military life. Due to the complexities of modern operating environments with multiple exposure risks and mental stress factors this life-cycle focus has become a prominent responsibility. Hence, proactive surveillance by multidisciplinary health professionals across the full life cycle of deployment operations is required. Integration of information across all successive phases is critical to examine cause-and-effect relationships and to make adjustments in medical preparation and support, based on the health status of forces monitored across the full deployment life cycle. There is a need, both at national and multinational

formation level, to bridge the full life-cycle of specific operations and maintain focus on health issues germane to the entire force for important feedback. This serves both follow-on forces planning for longer-term operations and tailoring and enhancing life-cycle medical surveillance for future operations. The life-cycle assessment demands participation by national and multinational formation health professionals who interface with medical staff involved with each component phase of individual deployments. Information exchange is essential. This exchange must comply with the contributing nations and multinational formation fundamental governing principles, standards and laws, including national approval, medical-patient confidentiality, legal requirements and limitations.

Pre-Deployment Medical Readiness Preparation and Baseline Assessment

National and multinational formation command emphasis must be placed on personnel readiness before deployment so that medical (including dental and mental health) fitness and preparedness for duty upon arrival in a theatre of operation are maximally achieved.

This requires that each contributing nation establish medical pre-deployment criteria and a system for administration, which includes, at a minimum, screening personnel for the following:

- **Physical and Dental Fitness.** Compliance with contributing nations' and, when defined, with NATO fitness requirements (contained in relevant medical standardisation agreements), for personnel prior to deployment.
- **Mental Fitness.** Compliance with cont5ributing nations' and, when defined, with NATO medical requirements.
- **Immunisation Coverage.** Compliance with both the standardisation agreement *(STANAG 2037)* "Vaccination of NATO Forces" requirements and in response to medical intelligence summaries for specific operations (e.g. as contained in the relevant operational plan). Appropriate immunisations must be given to all deployed personnel, as guided by medical intelligence estimates of the infectious health risk.
- **Preventive Medicine Training.** Training should at a minimum include emphasis on preventive medicine measures for key infectious disease and environmental health risks, and on core preventive medicine principles, including following good personal hygiene and sanitation.
- **Baseline Medical Surveillance Documentation.** Increasing national and international emphasis is being placed on establishing strong baseline medical surveillance for deployed military forces due to illnesses and disabilities liability for multinational troops upon return from field deployments.

Each nation has clear primary responsibility and liability incentive at the pre-deployment phase of operations for establishing and effectively executing a comprehensive baseline medical surveillance programme, to include both physiological and psychological health status. Although establishing objectives and executing a baseline medical surveillance are fundamental national responsibilities, the NATO or multinational formation commander has a collective responsibility for assuring that nations participating in NATO operations deploy healthy, fit-to-fight and sustainable forces as part of the team. NATO standardisation objectives involve harmonisation and integration of fitness requirements from member and participating nations.

System of Primary Health Care in Kiev Military-Medical Center

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The strategy of the World Health Organization (WHO) concerning the reorientation of health service to the primary medical care (PMC) is accepted by the majority of the states of the world. There are strong methodical, financial and economical arguments for this.

Taking into account the urgency and the importance of this problem, the Ministers of Health of many nations have accepted the Lublin Charter in 1996, which recommends that all health care systems develop and improve the PMC. The specific features of the health care system reform in Ukraine, the status of its financing, the process of decentralisation and the transition to a market economy, all also emphasise the need to give a high priority to PMC.

The main purpose and tasks of the reform of PMC are: a) the gradual improvement of the health status of the population by the introduction of preventive measures, by early diagnosis of diseases, and by improving health care access and quality, b) to distribute health care in an equitable manner across primary, secondary and tertiary levels, c) the rationalisation of all types of public health services, d) to reduce the costs of medical care by restricting specialised medical care to cases that really need it, and e) to reduce the number of hospital admissions and to expand the network of day-care and medical aid stations. In this way, we will open the possibilities for the population as a whole to employ medical services, we will increase the patient's opportunities to choose a doctor, and we will increase the responsibility of the physician for the health status of his patients.

According to the Lubin Charter, one of the priorities of the reform of medical support is the reorganisation of the general and specialised out-patient medical care.

The basic principles of our reform of the primary medical care system of the military-medical service are: a) to reorganise primary medical care on the territorial bases and to give the primary responsibility for the quality of medical care to enrolled military personnel and MOD employees; b) to provide specialised out-patient care by the medical specialists of the military hospitals; c) to realise a full availability of PMC and to decentralize the doctor's territorial offices to achieve maximal access of patients to medical care.

Within the framework of the traditional military-medical service structures it was impossible to realise most of these principles of medical care. There was a huge surplus of hospital beds and of doctors in garrison treatment facilities, and there were many medical aid stations where the medical personnel worked often less than half time. In addition, the diagnostic capabilities of the medical units was insufficient.

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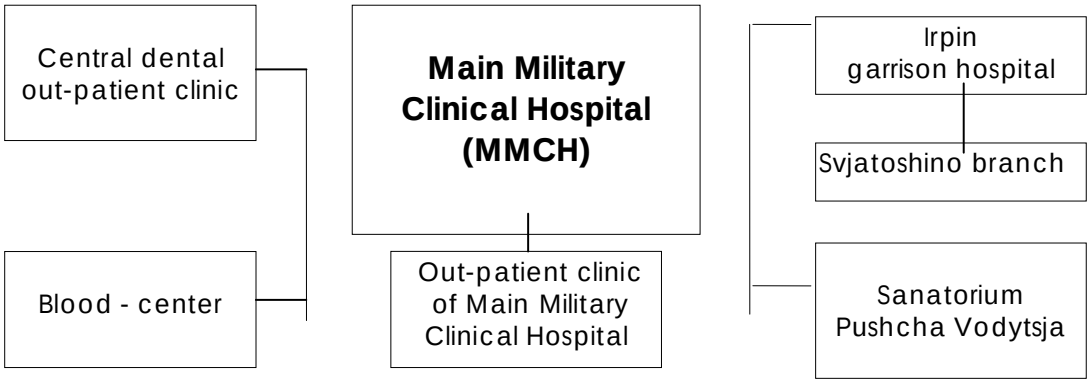
Because there were no medical funding resources available at the garrison level, and because the commanders of the Kiev garrison medical service lacked the means to control the resourcing, there were insufficient opportunities to carry out a redistribution of the resources between the out-patient and the in-patient components of medical care. The opportunities of day-care and home based medical aid stations were used insufficiently.

Thus, radical changes were needed in the medical care system of the Kiev garrison. These included an optimisation of the structure-functional model, implementation of a system of financing, a rational distribution of medical resources, the introduction of better opportunities for the training and promotion of medical personnel, an increase in the amount of medical personnel, and improvement of the professional structure in conformity with modern standards of medical care.

The Kiev Military-Medical Centre was established under special order of the Minister of Defence of Ukraine. Its structure is shown in chart 1.

Chart 1.

Structure of the Kiev Military-Medical Centre



The work of the Kiev Military-Medical Centre started with the development of a set of legislative documents regulating the organisational, managerial, financial and professional aspects of the Centre and the functioning of its units. The development and implementation of credentials and privileges for general military practitioner was an essential part of this work.

First of all we will have to define some important terms. According to the definition accepted by the Levenhort Panel of Experts, the "general practitioner" (GP) is a licensed physician who provides individual primary and continuous medical care to the single persons, families and population, irrespective of age, sex and kind of disease. The “family doctor” is a qualified physician who has the legal right to give various types of primary medical care to patients in a fixed territory.

Many experts consider it very difficult to distinguish between the functions of family doctor and GP. However, taking the special features of the medical care for military personnel and MOD personnel into

account, the GP would seem to be more acceptable for military medicine. An important part of the primary health care reform is the staffing of the out-patient clinic.

Table 1.

Completion of out-patient clinic of Main Military Clinical Hospital by physician staff.

Category of staff	**Number of positions**	**Occupied**	**Unoccupied**	**% of occupancy**
Officers (Medical Corps)	13	11	2	84.6
Civilian physicians including:	62	61	1	98.4
- general practitioners	59	49 + 10*	0	83.1
- surgeons	3	2	1	66.6
Total:	**75**	**72**	**3**	**96.0 %**

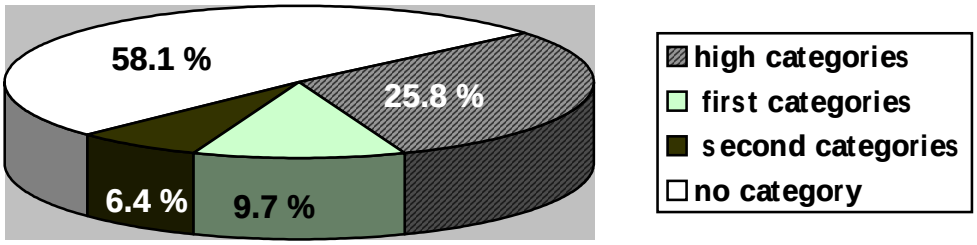
* 10 positions of general practitioners are occupied by 20 interns, who are taking internship under the program of "general practice - family medicine ".

As the data show, the current number of GPs allows us to carry out the primary health care reform successfully. Nevertheless, we continue to pay attention to the training of GPs through internship. Presently, 20 interns take a general practice - family medicine course.

At the present time, 58.3 % of the doctors have a GP certificate. All of them were selected from the internal medicine specialists during last three years. 13.3 % of the doctors will be sent for GP specialisation later this year. Thus, the total proportion of GPs will increase to 71.6 %. The other categories of doctors are highly skilled in internal medicine, with sufficient practical experience, which allows them to carry out the duties of the GP quite effectively.

Distribution of the MMCH doctors on qualifying categories.

Chart 2.



Thus of the total of our physicians, 58.1 % are still without qualifying categories. The reason for this is that they do not make enough hours to get the required qualification. Presently, we work on additional certifications for doctors who were appointed to positions of GP.

The introduction of the new PMC system in 1998-1999 has already yielded positive results. For example, in 1998 only 38 % of patients visited GPs, the rest (62 %) preferred to use the services of specialists. In 1999, this ratio changed radically (64 to 36 %).

According to published data, the average structure of patient visits to GPs is: internal medicine 70,7 %, diseases of ear, throat and nose 3,7 %, diseases of nervous system 3 %, diseases of skin 4,7 %, eye diseases 1,7 %, surgical problems 7 %, others 10,8 %. The distribution health problems of the patients who visited GPs in the out-patient clinic of Main Military Clinical Hospital in 1998-1999 was 68,3; 0,16; 11,0; 3,0; 0,24; 3,0; and 10,2 %, respectively. The background of these differences will be studied later.

We also analysed the structure of diseases based on patients visits to the GP.

Table 2.

The structure of diseases, that required visit to general practitioner of the out-patient clinic of Main Military Clinical Hospital.

No	**Disease**	**Figure**	**%**
1	Influenza and other ARI	151	15.1
2	Coronary heart disease	130	13.0
3	Essential hypertension	109	10.9
4	Chronic gastroduodenitis	73	7.3
5	Peptic ulcer	67	6.7
6	Diseases of the muscles and skeleton	61	6.1

7	Diseases of respiratory system	41	4.1
8	Diabetes mellitus	30	3.0
9	Diseases of digestion system	30	3.0
10	Cholecystitis	28	2.8
11	Diseases of urogenital system	22	2.2
12	Traumas	12	1.2
13	Diseases of nervous system	9	0.9
14	Eye illnesses	7	0.7
15	Diseases of ear, throat and nose	5	0.5
16	Other diseases	130*	13.0
17	Practically healthy	95**	9.5
	Total:	**1000**	**100**

* “Other diseases” concern: tonsillitis, chicken pox, disease of the skin, and others.

** “Practical healthy”: patients passed through military-medical expertise.

In 1999, 63 diagnoses were registered per one thousand visits to the GP. In 60 % of visits 15 diagnoses were made, followed by medical treatment provided by GPs on the level of specialised care.

An analysis of the working time of GPs in our out-patient clinic shows that he usually examines 60-70 patients per week, with a limited number of home visits and the provision of care of patients in hospital wards. However, according to data provided by C. Dongherty (1988), a GP normally examines 175-182 patients per week and provides hospital care to 27 patients. The same observations have been published by other researchers (Ju. Gubanov, 1994; O. Mulka, 1999).

So, we have a large reserve which will allow us to further improve of the organisation of the GP working day. The last issue we will address is the method of working of physicians in the territorial districts, who are assigned to military units and educational institutions.

Table 3.

Number of methodical visits of medical officers of the out-patient clinic of Main Military Clinical Hospital to physician territorial districts.

Number of visits	**1998**	**1999**	**2000 (5 months)**
Educational institutions	8	31	25
Military units	11	66	43
Total:	**19**	**97**	**68**

The described initiative has resulted in an improvement of the managerial and medical aspects of primary physician care, and in a more rational use of the health recourses of the Kiev Medical Center. As our experience shows, the development of primary medical care by the GPs on a territorial principle seems to offer the best perspective. The organisation of the work of the GP in providing PMC to military personnel and MOD employees of the Kiev garrison requires further study for scientific substantiation.

Post-Deployment Phase Medical Status Monitoring Functions

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History shows that even in peace time, the State sometimes forces military specialists to work under conditions which demand a maximal mobilization of the body functional reserves. Vivid examples are the participation of the Ukraine Armed Forces in the emergency and clean-up operations after the Chernobyl disaster and in the process of dismantling the Ukraine nuclear weapon arsenal, the need to maintain high levels of professional skills and combat strength among military personnel notwithstanding limited materiel supplies and serious financial problems, and the participation of the Ukraine peacekeeping contingent in a multinational military mission.

Successful task performance among military personnel is based on their professional capabilities. Taken together, these can be considered as the combat potential that is needed to attain tactical, physical and psychological superiority over adversaries. However, statistics show that a significant part of the specialized troops in the Ukraine Armed Forces, who have high levels of training level and long operational experience, leave the Armed Forces prematurely due to health problems.

An analysis of the behavior and the functional status of these individuals has revealed that they have a reduced resistance to the impact of extreme physical and psychosocial stressors. A study of Ukraine Armed Forces Research Institute of Military Medicine has demonstrated that occupational hazards combined with insufficient physiological, hygienic and social protection of military personnel should not just be considered as risk factors, but are actually causing damage to the body on cellular, organ, and systemic levels. In view of the need to implement adequate counter measures, a permanent monitoring system has been set up in order to screen the health status of personnel and to evaluate potentially damaging conditions and factors. A military-medical computer data-base was created by the Military-Medical Service of the Ukraine Armed Forces, as an integral part of a national population health monitoring system. The main task of this hygienic monitoring activity is to provide the military-medical authorities with adequate information.

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The computerized data-base of the Ukraine Armed Forces is based on a territorially allocated system of software and databases which are integrated in a standardized information environment through computer networks and telecommunication means. This system makes it possible to survey the health status of military personnel on three levels (national, regional and territorial), to collect and analyze health status indices, and to design diagnostic, treatment and rehabilitation measures.

The health monitoring among the Ukraine contingent participating in an international mission was carried out in two phases. In the first or deployment phase, the main emphasis was on identifying all significant health risk factors at the area of deployment, and on the implementation of primary countermeasures. In the second or post-deployment phase, the impact of specific military and environmental factors on health status during the mission was determined, and a preventive rehabilitation program was put in action.

We found that there was a substantial increase in the incidence of combat and non-combat traumas and diseases during deployment, due to the impact of various adverse factors (combat injury, psycho-emotional and physical overload, disorder of a daily rhythm, poor hygienic, nutrition and household conditions, etc.). Our findings indicated that the most important health effect was a very high incidence rate of professional stress, which manifested itself in frequent severe complications of common infectious illnesses and aggravation of chronic diseases. There were also indications that the medical selection of the military personnel had been inadequate, that the professional qualifications of many soldiers were insufficient, and that there were frequent cases of mental and behavior disorders. The levels of stress experienced by the Ukraine military personnel were distributed as follows: mild: 53%, moderate: 33%, severe: 10%, very severe course: 4% of all cases. Incidence rates of common diseases was 1 per person/year and the total number of chronic diseases was 64 cases per 100 persons/year. The pathology multitude coefficient was established as 1,5. We found that the risk factors during deployment primarily affected the psycho-emotional functions of the military personnel (more than 60 % of all cases), and furthermore, in decreasing order, the digestive system (13%), the skeleto-muscle system (12 %), heart and circulation (10%),

and the nervous system (5 %). These data correspond to those found in a study of chronic diseases among military personnel. As we determined by long-term observation, the most important stressors were:

- Working in conditions of discomfort (night and daily duty, physical and mental overload);
- Lack of required materiel and supply;
- Poor housing conditions (25% of the soldiers);
- Family problems (financial, economic and other).

An analysis of the occupational health risks associated with the conditions under which the military tasks were performed, indicates that deployment phase stress contributed significantly to the subsequent deterioration of the health of the military personnel and to the premature termination of their professional careers.

Based on the findings obtained during the social-hygienic monitoring of the Ukraine peacekeeping personnel, specialists of the Military-Medical Register have developed measures for preventive, curative and rehabilitation in order to minimize the negative health-related consequences of international military missions.

The planned measures fall into six categories:

1. Improving the professional selection procedures;
2. Expansion of the medical control system;
3. Improving the individual and collective protection of military personnel against injuring factors;
4. Improving the combat exercise conditions;
5. Improving the quality and effectiveness of patients care;
6. Implementation of measures aimed at health restoration and rehabilitation.

As we have determined, these measures can be realized even under the current complicated social and economic conditions of Ukraine Armed Forces. Implementation of the proposed measures will move along with the implementation of the new organizational model of the Military-Medical Service in Ukraine and it will not require any additional tasking.

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The Program of Reforming the Public Health System of Ukraine and the Perspectives for Its Realization

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An analysis of the public health conditions in Ukraine reveals an unsatisfactory medico-demographic situation which is characterized by a low birth rate, a relatively high mortality rate, a negative population growth, a reduction of the expected human life-span as well as dissemination of a large group of diseases.

Obviously, the existing public health system in Ukraine does not meet the requirements of an up-to-date efficient public health system. There have been extensive developments, but experience indicates that there are many economic and organizational problems, as well as strategic flaws in the development of the public health system. I must repeat that the existing system of public health does not meet today's requirements and needs to be improved.

The key problems of public health are:

1) the insufficiency, inconsistency and inefficiency of the measures directed to preserve and strengthen public health;
2) an irrational organization of medical care, a disproportion in the development of out-patient and in-patient specialized care, unsatisfactory communication and the imperfections in the sequence of care.
3) imperfect and poor legal support of the public health system.
4) insufficient funding of the branch, resulting in low incomes of medical personnel, lack of means for accessible, high-quality and effective medical care.
5) the need to improve training and postgraduate training of medical personnel, to raise the skill levels and to improve working conditions, as well as its quality and effectiveness.
6) deficiency of state-of-the-art medical technologies, poor medical supply and material support of the public health facilities.
7) a low level of information support and management of the public health system.

Up-to-date requirements for an effective public health system determine **the main strategic tasks of Ukraine's policy** in the field of public health:

- to preserve and strengthen public health;
- to guarantee availability and quality of medical care;
- to contain the cost of medical care;
- to improve the medico-demographic situation: (birth rate, mortality rate, life-span);

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- to protect effectively the natural environment and to minimize the consequences of Chernobyl nuclear catastrophe;
- to increase the level of public health education and awareness, and to promote healthy lifestyle;
- to improve the work of all the branches of the public health system, to extend the rights and functions of the health service and its organization;
- to improve the organization of medical care (with priority for development of primary medical care), to regulate the network and structure of the medical facilities;
- to provide a rational utilization of personnel, financial and material resources;
- to improve the mechanisms of financing medical facilities and the remuneration of labor of medical personnel;
- to provide legal support of the public health system and its reforming.

An effective public health system does not depend on itself. On basis of analyses to identify the main problems and tasks, carried out by leading Ukrainian experts on public health, a program has been developed to reform the public health system. **The legal base of the program** is: the Constitution of Ukraine and “The Fundamentals of Ukrainian Law of Health Protection” which proclaim and guarantee every individual's right to health protection. The key issue in the reform of the system is the reconstruction of the financing system, the mobilization of the necessary finances at the expense of the state budget, as well as extra budget resources.

It seems to us that stress should be placed on mixed financing and the involvement of previously unused non-traditional sources such as health insurance, charity funds of various kinds, fines and penalties for environmental pollution etc. The proposed financing mechanisms will make the budget limitations less rigid and can allow a more flexible response to the increased public health needs of the community. The medical insurance system is becoming an important and new element of financing.

Thus, the main tasks of Public Health system reform are:

- to develop a state policy and strategy in the field of public health;
- to improve public health management forms and methods on every level;
- to identify the priorities of medical care and to determine the range of medical care for Ukrainian citizens guaranteed by the state;
- to regulate the network, structure and functions of medical facilities;
- to restructure the system to eliminate the current disproportion in the development of various kinds of medical care;
- to develop capacity and quality standards for medical technologies compatible with every kind of medical care;
- to implement an effective system of multi-channel financing of Public Health based on mandatory social medical insurance;

- to take measures for decentralization of medical facilities by privatization; to promote individual medical practice; to create competitive conditions among medical facilities and physicians which will help to make medical care accessible and high-quality;
- to develop a rational system of accreditation of medical facilities and licensing of physicians which will promote various types of medical care;
- to develop and implement state-of-the-art medical technologies;
- to improve the mechanisms of financial compensation of medical personnel according to their qualification, work content, quality and results;
- to create a system of information support based on a wide use of computer equipment, unification of informational methods and means, to develop an information network and to improve the medical statistical service;
- to develop methods of legal assistance of patients and medical personnel, and legal support for the system's reforming and functioning.

The Program realization stages and its preliminary terms have been determined as follows: **the first stage** – preparatory; **the second** – the Program formation; **the third** – the experimental stage; **the fourth** – the period of the development of normative and legal documents and organizational arrangements; **the fifth** – the implementation period of indicated above developments.

The Program must provide the performance of the system's main tasks which will improve the system and make its activity more effective and will finally make the improvement of public health possible.

The execution phase will allow to set up rational ways of public health reform, its restructuring, improvement of the medical care organization, its resource provision, the promotion of healthy lifestyle, and the preservation and strengthening of public health. In the future, legal support and information support of the public health system and its management on every level needs to be improved.

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Deployment Phase Medical Readiness Support

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SUMMARY:

This paper on "Deployment Phase Medical Readiness Support" will complete the information on medical readiness preparation requirements for the deployment of force to a NATO/Multinational Medical Mission.

DISCUSSION:

Deployment Phase Medical Readiness Support Functions

During the deployment phase of NATO or other multinational formation operations, several key monitoring and surveillance functions provide important measures of medical support readiness.

These measures are defined as follows:

- Assessment of the overall health readiness status of the troops through medical situation reports.
- Establishment of an epidemiological surveillance data-collection and reporting system.
- Verification of a system for the management of stress and prevention of Post Traumatic Stress Disorders (PTSD).
- Certification of the readiness and preparedness of non-NATO/multinational formation deployed medical capabilities.
- Assessment of the medical force protection function, which will provide commanders with an assessment of the readiness and adequacy of the medical support structure at all levels, identify positive lessons learned to assist and thereby promote exploiting operational success across the entire theatre of operation and advise commanders on medical support issues requiring national or collective action.
- Provision of selected force protection preventive medical initial and reinforcement training.

Medical Force Protection

Up to here the main monitoring and surveillance functions to measure medical support readiness for deployed forces have been mentioned.
In addition I would like to expand on this it a little bit covering the overall aspect of Medical Force Protection. Medical Force Protection measures mainly applies to protect a deployed force, no matter if these forces are national forces or part of a multinational formation. However, Medical Force Protection is not limited to the deployed force but includes several functions during the pre- and post-deployment phase.

The presentation on "Pre-Deployment Medical Readiness Preparation" already provided some information on
- Medical Force Protection Assessment,
- Life-cycle Medical Surveillance for Operational Deployment and
- Pre-Deployment Medical Readiness Preparation and Baseline Assessment.
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Together with the
- Deployment Phase Medical Readiness Support Functions,

some more medical preparatory and protective measures have to be taken into account to complete the whole circle of Medical Force Protection before, during and after a deployment.

Paper presented at the RTO HFM Specialists' Meeting on "The Impact of NATO/Multinational Military Missions on Health Care Management", held in Kiev, Ukraine, 4-6 September 2000, and published in RTO MP-068.

These measures are:

- Post-Deployment Phase Medical Status Monitoring Functions,
- Preventive Medicine, Preventive Medicine Requirements and Civil Labour,
- Morbidity Surveillance and Casualty Reporting and
- MASCAL and Incident Response Planning.

Post-Deployment Phase Medical Status Monitoring Functions

Post-Deployment Phase Medical Status Monitoring is another major phase of medical status monitoring, which applies to the post-deployment, or troop return phase of an operation.

It is an important primary function of national deployment responsibility, but also bears important implications for shaping follow-on phases of the same NATO or multination formation operation, and for future operations.
Information pertaining to changes in the health readiness status of re-deploying forces is important in both the short and longer-terms at national and multinational levels of management.
In the short term for both participating nations and multinational formation commanders important insight may be gained on the adequacy of medical intelligence and health support services thereby providing input for changes in current or follow-on multinational operations.
At the national level critical fitness for duty determinations for returning troops is also gained.
Longer-term benefit may also be achieved for the continuation and enhancement of multinational formation operations where economy and efficiency will continue to be important principles governing the multinational medical support.
Longer-term national relevance regarding liability determination for follow-up medical support requirements may be ascertained.

Preventive Medicine and Medical Force Protection

Diseases and Non-Battle Injuries will be an ever present risk to personnel. Medical support plans must include provision for preventive medical measures and the means to implement them effectively. The execution of operational plans requires a close collaboration of preventive medicine and medical force protection programmes.
Preventive medicine measures must be capable of:

- Identifying the risks and threats to the health of all personnel deployed in a specific theatre of operations, from terrain, climate, endemic disease, special environmental and occupational hazards.
- Identifying necessary preventive and controlling measures and advising commanders on their implementation, to include the development of a theatre policy on immunisation and prophylactic measures and on the appropriate training of all personnel, especially on measures to prevent food/waterborne and arthropod-borne diseases.
- Advising on and auditing the quality of water and food.
- Auditing and supervising implemented measures.
- Gathering of epidemiological and other technical statistics and information.
- Advising commanders on the overall health risks and threats and the limitations they may place on the campaign.

Preventive medicine measures are an essential element of the planning process. Their implementation begins during the pre-deployment stage and continues throughout the deployment, irrespective of overall changes in the conduct of the operation and must extend well into the post-deployment period. They involve every individual in the operational theatre, who must be aware of necessary personal protective measures and be trained accordingly. The organisation to undertake preventive medicine measures must therefore be in place from the outset and must extend from theatre headquarters down to units and below. Its shape and size will be mission-dependant but will include, at least, individual preventive medicine advice at every level of operational command. Depending on the circumstances, this advice may come from a single staff officer with multiple medical responsibilities or from a full preventive medicine staff.

Preventive Medicine Requirements

The following mentioned requirements apply in the field of Preventive Medicine:

- **Medical Intelligence / Information**
  The single most essential requirement of preventive medicine is a source of prompt, usable medical information and/or intelligence, available at the planning stage before the outset of an operation. This information must be accurate and its source sufficiently dynamic to inform the user quickly of threat changes.

- **Immunisations, Education & Training Materials**
  Other preventive medical resources will include provision for immunisations against specified diseases and chemoprophylaxis, advice on training and information for the prevention of Diseases and Non-Battle Injuries, prophylactic medical materiel and a spectrum of mission dependent field support measures.
- **Laboratory Capabilities**
  Surveillance and assessment of environmental health risks require laboratory capabilities. Field laboratory capabilities are part of the environmental health team support functions focused on identification, surveillance and monitoring of health risks in field operating environments. These capabilities should include technology for sampling and analysis for NBC contaminants in air, soil, water, and food supplies. Appropriate equipment and transport capabilities are needed both in the form of a field mobile laboratory to support immediate sampling and initial screening of hazards; and a fixed laboratory capability to support both confirmatory evaluations and more extensive assessment of collected field samples pertaining to naturally occurring and manmade health risks.

Morbidity Surveillance and Casualty Reporting

Both morbidity surveillance and casualty reporting systems are important functions performed by medical staff elements to support the multinational formation commander in the ongoing objectives of protecting the force and conserving the fighting strength and manpower of the force. The disease surveillance function serves as a key indication of troop health status, and as a key warning system or sentinel to trigger further investigation, preventive countermeasures, or other command action to reduce the adverse impacts of health threats. It also provides an estimate of the impact (manpower and working day losses) of disease occurrence. An appropriate morbidity surveillance system should involve the monitoring, collection, and evaluation of illness and injury data on all deployed personnel who report for medical treatment support, both on an outpatient and inpatient basis. It is also set to run in conjunction with other national reporting systems. Epidemiological data on all treatment visits, including both first and subsequent attendance in the theatre of operation, are collated and analysed at theatre level. For NATO such a morbidity surveillance system called EPI-NATO is available. Through the quantitative identification of causes of morbidity and qualitative measuring of their effect, an evaluation occurrences as well as consequences is the prime objective of this survey. Findings may then support appropriate response actions, both in the short and long term.

Civil Labour

During operations civil labour is often utilised in large numbers and this can pose a number of health hazards:
They may be reservoirs of infectious disease. When they are billeted in large encampments, the encampments can become unhygienic and pose an increasing risk of infectious disease. Infection of own troops from infected food handlers, from contamination of water sources and from sexually transmitted diseases are historical problems associated with civil labour. The host nation should be responsible for the health of civil labour and any camps they occupy. However, where the host nation’s medical infrastructure is inadequate, the contributing nations employing civil labour need to make sufficient arrangements in order to protect the health of their own troops. At a minimum these arrangements must include a strategy to eradicate infectious diseases which are a threat to one’s own forces, and a first aid service during work. Depending on the supporting civilian infrastructure, consideration will also have to be given to providing a primary health care service, if only to ensure the continued provision of the required labour.

MASCAL and Incident Response Planning

A mass casualty (MASCAL) situation is one in which an excessive disparity exists between the casualty load and the medical capabilities locally available for its conventional management. In crisis response operations a MASCAL situation will most likely be the result of accidents (road accident, plane crash, bomb, fire, etc.), hostile actions (guerrilla warfare,

terrorist attack) or natural phenomena (flood, earthquake, etc.). Incidents will most likely be smaller in scale compared to a shooting war situation. A series of suitable plans must be developed for different scenarios at tactical level and integrated into a theatre-wide MASCAL Plan. Force protection measures require a rapid and efficient response to MASCAL situations and incidents. Their effective management shows the theatre ability to respond as a whole to a medical crisis by cross-borders mobilisation of resources and minimisation of obstacles to interoperability.

MASCAL exercises at theatre and local level will help in developing and testing the overall MASCAL Plan. Training objectives may include amongst others:

- Evaluate the ability to conduct theatre level medical regulating and aero-medical evacuation.
- Identify interoperability issues affecting multinational support.
- Practice cross levelling of medical supply and blood products.
- Determine the adequacy of emergency care resources.
- Test communications connectivity.

The Problem of the Pilot's Professional Health Restoration

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When analyzing the dynamics of the Russian Airforce air crew's functional condition, working capacity and professional reliability in the process of their flight activity and the results of clinical and physiological examinations, we witness a distinct tendency for deterioration of air crew's level of professional health owing to a complex of psycho-physiological, social, organizational, ecological and demographic factors.

Practice and research activities confirm the necessity of having means and methods available to rehabilitate the pilot's functional status in the process of his professional activity, including psychological, electro-physiological, pharmacological and other types of treatment.

The main tasks when rehabilitating the pilot's functional status in pre-flight or in post-flight situations include:

- enduring and stable maintenance of operational working capacity;
- mobilization of psycho-physiological functions to perform the most crucial stages of work;
- treatment of acute forms of neuro-emotional reactions;
- treatment of monotony, hypodynamics and tiredness (exhaustion);
- rapid restoration of functional status after physical and mental overload;
- regulating the level of neuropsychic and motivational activity, creating a favorable emotional and sensory background;
- optimization of adaptive reactions of the organism to shifts in environmental factors and in working conditions;
- formation and maintenance of professionally significant aspects of psychosomatic functioning of air crew.

Such a variety of tasks necessitates the development and utilization of a wide complex of means and methods for rehabilitating the pilot's functional condition, and these should be able to have an effect on different functional systems of the organism. The specific choice of means and methods depends on the specific nature of the air crew's functional disorder, and the work schedule as well as the personality of each pilot should be taken into consideration. The ultimate aim of the treatment is to maintain proper levels of efficiency by mobilizing the protective and compensatory abilities of the organism. Hence, rehabilitation of the pilot's functional status serves to maintain the pilot's professional health.

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In our opinion, the problem of restoring the pilot's functional status in the field of aviation medicine should be considered within the wider context of functional status control of healthy individuals during their professional activities. The essence of this approach includes the assessment, monitoring and evaluation of the psycho-physiological reserve level of the pilot's organism. It also implies a purposeful use of adequate means and methods to mobilize compensatory and adaptive mechanisms, which regulate the primary physiological and mental functions which subserve the pilot's professional health, and to ensure a proper level of the pilot's working capacity and his professional reliability.

Rehabilitation medicine serves to optimize the individual's professional health level, which is affected by a complex of physiological, hygienic, occupational and social factors. This can be achieved by means of psycho-physiological reserve diagnostics during on-line medical inspections and thorough medical examinations as well as by a complex of methods to treat functional disorders. This can be performed at a military unit level or at a specialized rehabilitation center, sanatorium or hospital.

The main rehabilitation measures include:

- treatment of pathogenetic mechanisms of functional disorders;
- diagnostic and rehabilitative measures which take into account the professional, social, physiological and psychological spheres of the pilot's life and activities;
- influencing the pilot's personality and his primary mental and physiological systems;
- a succession of treatment phases: step by step expansion of their effects and complexity, alternation and supplementation of methods at prophylactic, correction and restoration periods etc.

The principal means and methods for the psycho-physiological status control of pilots are:

Means and methods to influence the pilot's psycho-physiological status during long flights:

* psychosomatic self-management;
* electro-stimulation of muscles;
* self-massage of bioactive points;
* physical exercises;
* audio-visual aids.

Rapid correction methods of the pilot's performance capacity:

* psychosomatic self-management;
* rational psychotherapy;
* music therapy;
* central nervous system (CNS) electro-tranquilization;
* sauna;
* hydrotherapy;
* manual therapy;

* recreational therapy (active rest);
* hearing function stimulation;
* hyperbaric oxygenation;
* climatotherapy;
* physical exercise.

Methods of increasing body functional resistance to flight and navigation conditions:
* electro-stimulation of muscles;
* CNS electro-tranquilization;
* neuropeptides;
* thermal adaptation regimes;
* adaptgenes, mobilizing and energy saving stimulants;
* aminoacid and vitamine complex;
* bionormalizer biocorrector;
* physical exercise, etc.

THE AREAS OF THE APPLIED METHODS

* Long Distance Aviation;
* Military Transport Aviation;
* Navy Aviation;
* Military units;
* Recreation and Rehabilitation Center;
* Specialized Treatment Center;
* Sanatorium.

THE RESULTS OF THE APPLIED METHODS

* Maintenance of crew members' performance capacity, prevention of fatigue (exhaustion), increase of the pilot's performance capacity during long flights;
* Reduction of the recovery period, increase of the organism reserve capacities, improvement of quality of working activity;
* Increase of thermal and vestibular stability (resistance) of Navy Aviation air crew.

The realization of the principal regulations of the Rehabilitation Medicine requires that the research and diagnostic centers are transferred to the military unit level, which will make it possible to monitor the

functional status and the reserves of the organism directly in the combat training process, and to diagnose primary function disorders of separate systems at early stages. This approach will allow a redirection of the medical monitoring from somatic diagnosis and disease verification to a quantitative assessment of the health level and its reserves. On this basis, timely treatment of unfavorable changes and negative effects of professional environment is possible.

The complex system of professional health restoration introduced in the medical support practice includes a differentiated application of adequate psycho-physiological methods, directed at pathological processes, as well as a normalization of the regulatory, power-saving and resistant functions of the organism. It may increase the professional and physical working capacity levels by 20-30%, it may prevent atherosclerosis and cardiovascular diseases (by 1.5 –1.7 times) and it may help to reduce disabilities (by 1.6 –1.9 times). On the whole, this approach results in increasing levels of functional reliability and professional health of air crews.

Despite some positive results, however, the problems in rehabilitative medicine in aviation are far from being resolved. Many questions concerning theory, applied research, organization and staffing still remain unanswered. In our opinion, the most important issues for further study are:

- development of research on the control of the pilot’s psycho-physiological status during his professional activity;
- identification of diagnostic methods, estimation and correction of the pilot’s psycho-physiological status and his working capacity;
- development of airborne equipment and programs for monitoring the pilot’s psycho-physiological status in flight;
- development of a computer-based pre-nosological expert system for diagnostics and correction of the individual’s professional health;
- creation of a system for the diagnostic, health improving and restoration measures for technical staff / engineering personnel;
- preparing of printed materials (programs, manuals, lectures), video films for training and postgraduate training of flight surgeons.

Of course, there are various serious problems involved in the improvement of the logistics needed for the implementation of the rehabilitative medicine system on the level of military units, and in the building of specialized rehabilitation centers. The organizational changes which are presently taking place in the Russian Army and Air Force may create the necessary prerequisites to successful solution of the problems of air crew’s professional health restoration.

Unified Principles, Requirements and Standards of Armed Forces Medical Support

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Introduction

Successful completion of any military mission requires a proper organization of the health service support (HSS) of the troops. The principal document serving as a guide for military and military-medical commanders, planning staff and physicians, is the Military-Medical Doctrine (Doctrine).

There are national (multiservice), allied (NATO) and combined (NATO and PfP) Doctrines. Allied and combined Doctrines are designed to provide the necessary level of unification and standardization allowing to carry out joint medical services tasks more effectively and at low cost. On the other hand, they should take the special nature of national systems of medical services into account. Conceptions of allied or partner Doctrines must be presented in such manner that national differences in the Armed Forces medical support of participating countries will not trouble their interaction and cooperation.

This paper focuses on the conceptual approach to the development of the Doctrine for Ukraine, and on differences and similarities with Doctrines of NATO and other countries. It will be emphasized that it is a common task for military commanders and the medical service, to ensure high standards of professional health as a crucial component of the combat strength of military personnel. Therefore, it is necessary to clearly determine the responsibilities and actions that are necessary in order to protect and preserve the health and life of military personnel.

Terminology

The concept of 'professional health' is defined in terms of absence of illness, and the availability of the necessary levels of compensatory and defensive mechanisms which will allow soldiers to maintain a high combat strength under all conditions.

'Combat strength' is a term that is applied to military personnel which is qualified to carry out combat operations in their assigned units, while the term 'operational readiness' is applied to the military organization (unit, formation, facility) which performs missions or functions in combat operations. 'Combat strength' is a comprehensive term including several elements.

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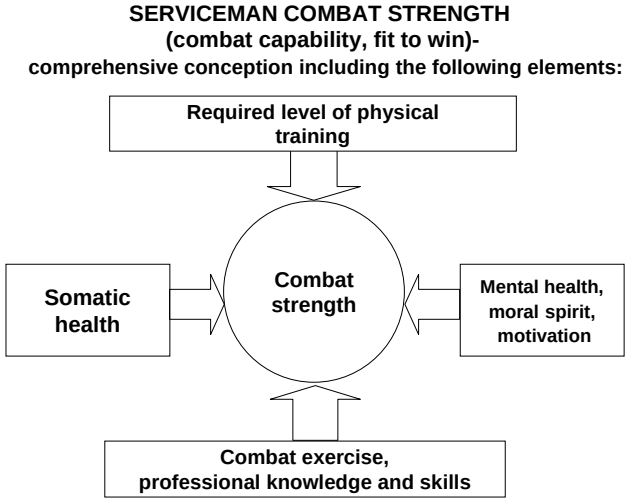
Figure 1.



The Doctrine applies to HSS of all Armed Forces missions and operations, including war. This is because HSS in crisis and conflict is based on, and originates in the military health care system in peacetime, through progressive reinforcement. Medical readiness must always have a sufficiently high level, in order to allow for a smooth transition from peacetime to crisis or conflict posture.

However, during war or special missions (disaster relief, antiterrorism actions, peacekeeping missions), specific forms of HSS organization are required. To cope with this requirement, the organizational and operational sections of the Doctrine must be divided into separate chapters relating to missions other than war and to actions in the theatre of operations.

The general principles of medical care are:

- timely medical care and therapy;
- continuous, successive and consecutive care in progressive manner;
- general understanding of the nature and pathogenesis of illnesses and traumas;
- priority to measures to prevent disease, injury, stress and the development mental disorders.

These principles are common for medical support of all military services performing any of their mission (operation) in peace and war time.

The medical operational principles include:

- allocation of authority and responsibility;
- interactions between commanders, medical and other services in HSS;
- planning of HSS;
- medical supply organization;
- organization structure and management of medical support system;
- transition from peacetime to the period of war;

- progressive levels (echelons, roles) of medical care;
- the use of health manpower and means in accordance with operational and medical situation.

Military-medical doctrine content

Nowadays, there are many approaches the development of the Doctrine. The Doctrinal rules concerning military-medical services of NATO and the USA are provided in various documents with different titles and meanings. Some of them refer to principles and policies, while others describe strategic planning or conceptions of the medical support organization.

The USA Doctrine is a part of the Military Medical Readiness Competencies and it defines the fundamental principles by which military forces or elements guide their actions in support of medical objectives.

We propose that Doctrine should not be restricted to principles of medical support. To translate these principles into practical actions, it is necessary to give them a status of mandatory requirements based on unified military-medical standards.

Definition

The Doctrine encompasses the totality of general principles, single requirements and standards of Armed Forces medical support, aimed at:

a) preservation of health and enhancement of personnel combat capability;
b) saving life, prevention of disability, possibly quick return to duty of wounded and sick;
c) achievement of maximum effectiveness of all medical support systems.

The Doctrine should apply to all services of the Armed forces, and be extended to all types of medical support (curative-prophylaxis, preventive medicine, NCB defense, medical supply). The Doctrine is based on advances of military and civilian medicine, public health practice, the State military Doctrine, and the nature of contemporary wars. In addition to the comprehensive medical support principles, the Doctrine may include planning directives, determines mechanism of interaction of medical service with military commanders and other services.

The next part of the paper is devoted to comparative evaluation of the main NATO, Russia and Ukraine doctrinal principles of medical support.

Levels of medical care.

Military physicians of Russia, Ukraine and other CIS countries use the term "Stage of medical evacuation". This is defined as the medical manpower needed and the means deployed on medical evacuation routes to admit, triage, provide medical care, treat the wounded and sick, and to prepare them for further evacuation.

The USA and NATO use the term "Role/ Echelon of medical support" which is applied to field medicine, and which defines four categories of medical resources, and the associated capabilities for treatment, evacuation, re-supply and other functions essential for personnel health.

The Russian definition lacks a specific description of one type of medical activity in the theatre of operations – the curative-evacuation support. Western definitions include this activity, but not fully. They use different terms (role, echelon, level) to designate stages of progressive medical support, and their contents are described incompletely.

We recommend to replace the terms "stage" and "echelon" with the standard international term "Level of medical support", because this corresponds more closely to what is referred to. The level of medical support may refer to e.g., first aid stations and treatment facilities deployed in certain order to carry out medical evacuation, to admit, triage, to provide the necessary levels and volumes of medical care, to treat wounded and sick, to prepare them for return to duty or for further evacuation, to carry out NCB medical defense care, and to re-supply.

Forms of medical care.

The classification of different forms of medical care which are commonly used in the field manuals of the USA and NATO are essentially differed from the categories distinguished in Russian and Ukraine documents.

Table 1.

Types of medical care

USA, NATO	Russia, Ukraine
- first care (aidman care)	- first care
- emergency medical treatment	- prephysician medical care
- initial resuscitative treatment	- primary physician care
- resuscitative surgery	- qualified medical care
- definitive treatment	- specialized medical care
- convalescent care	- rehabilitation
- rehabilitation	

The following allocation unifies the different classifications of forms of medical care:

1) resuscitation and stabilization – lifesaving measures;
2) emergency surgery and postoperative care – prevention of complications and disability;
3) definitive treatment and rehabilitation – full recovery, return to duty.

Medical capabilities (volume of medical care).

Russian and Ukraine military-medical regulations contain provisions for complete as well as reduced volumes of medical care. The latter is put into action when the capability of the treatment facility does not allow to provide care for all patients. In this case, only emergency and resuscitation procedures are performed.

According to NATO and USA policies, the capabilities of medical facilities fall into two categories:

- minimum capability, which is basic and mandatory, and which cannot be reduced below this level;
- augmented capability, when treatment facility is enhanced by selected personnel and other resources to meet specific requirements of a mission.

Our version of the categorization of volumes of medical care seems to be closer to real field medical practice. Proposed categories of capabilities of the field treatment facilities are the following:

a) routine (complete or basic) care, implemented in ordinary situations when the capacity of the medical treatment facility is not exceeded;

b) quantitatively extended care, by augmenting the same level of care;

c) qualitatively augmented care, with a selected specialized team of surgeons and relevant equipment to provide specialized care as close as possible to the combat area;

d) reduced care, limited to life-saving and emergency procedures in mass casualties situation.

Triage.

Triage is the process of sorting the wounded and sick patients into similar groups in accordance with the nature and severity of injury or illness, the urgency of the medical care needed and the character of evacuation.

Field medical manuals underline that in case of mass casualties, triage is conducted with the purpose to first provide direct medical care to patients having better chances to survive and return to duty. Some experts object to this approach as an unacceptable procedure, which leads to fatal outcomes among many persons with mortal wounds.

Table 2.

The Red Army combat personnel losses during the Great patriotic war, in million persons (by A. Rusakov, 1995)

Total number of wounded (1941-1945)	30,0
Of whom died	6,0
Definitely mortal wound	3,0
Wounded whose life could be saved	3,0

Due to importance of this problem, we will discuss it more comprehensively.

Expectant category of wounded

There are patients who have received serious multiple injuries, severe head and spinal trauma, large doses of radiation, or wide-spread severe burns. Treatment of this category of patients is time-consuming, and it threatens to exhaust the medical manpower and supply, while the chances of survival are small.

According to current military-medical policy, the treatment of this category of patients is, in most cases, limited to reduce their discomfort by administering large doses of analgetics and narcotics, although they demand emergency life-saving measures. We propose that in these cases, at least three aspects of medical care should be considered: medical, ethical and legal. The medical aspect is that there are no strict criteria available to attribute severely wounded patients to a group for which there is no hope. Therefore, in many cases, their survival depends on the personal experience, responsibility and morality of the physician, rather than on the capacity of the medical treatment facility. But there is also a juridical aspect, which relates to the patient's constitutional right for adequate medical care and treatment.

In many countries, the medical jurisprudence contains the term "abandonment or withdrawal of medical care of a suffering patient", and heavy punishment of the health provider is demanded for such misconduct. This problem has recently become more important, due to the increasing number of severe, multiple and associated injures in contemporary military conflicts.

Military-medical standardization.

Military-medical standards are official documents defining norms, rules and requirements related to different aspects of Armed Forces medical support.

The following main categories of military-medical standards can be distinguished:

- terms and meanings;
- measurement units;
- statistical values;
- devices, apparatus, tools;
- pharmaceuticals;
- medical equipment;
- credentials and privileges of health care providers;
- medical services;
- personnel health status;
- the combat strength of a soldier.

Requirements for military-medical standards are fourfold:

a) military-medical standards should be equal to, or higher than the national health standards;

b) standards of wartime should correspond with peacetime standards;

c) national standards should, as much as possible, conform to international standards;

d) unification of medical support for multinational forces is achieved by signing interstate standardization agreements (STANAG or others).

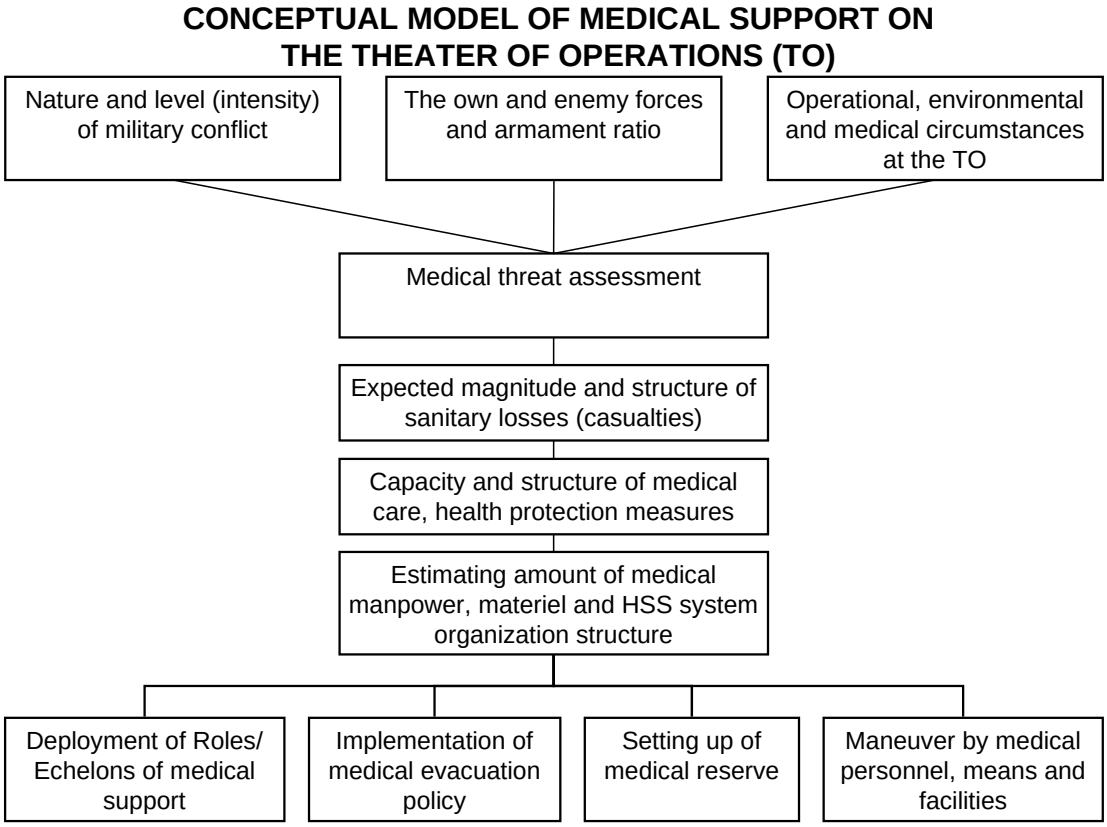
National military-medical services should make every effort to achieve the highest possible standardization in order to enhance medical interaction in joint operations. A common military-medical doctrine, in addition to standardization of equipment, terminology and procedures, validated through participation in joint exercises, provides the back-ground of force interoperability. At the international level, emphasis must be placed on the integration of medical services of contributing nations. This will have a decisive effect on the ability of multinational forces to achieve joint objectives.

Standardization of the military-medical terminology has one of the highest priorities. Our work in this area resulted in the "English-Russian-Ukraine alphabetical reference-book of military and disaster medicine" and "Abbreviations available in military and military-medical terminology of NATO".

The "Essential List of STANAGS" includes two NATO agreements of this kind: (1) STANAG 2131 – "Multilingual Phrase Book for the use by the NATO Medical Services (AMEDP-5) and (2) STANAG 2409 – "NATO Glossary of Medical Terms and Definitions (AMEDP-13)". These documents are limited to standard definitions of medical terminology, as used within the NATO military-medical services and they are based exclusively on the experience of the NATO community. It is the time to augment them with the military-medical terminology of PfP countries. To realize this idea, we suggest that NATO's Military Agency of Standardization (MAS) establish a permanent international team of experts on standardization of military-medical terminology. The final result of the activity of this team will be the publication and periodical revision of a multilingual encyclopedic reference-dictionary on military and disaster medicine.

In conclusion, let us show possible application areas of the Military-Medical Doctrine. These include: the development of a model of the military-medical system, the development of manuals and regulations, research and military-medical personnel training, the organization and management of national medical support systems for the Armed Forces, and the strategic planing of the medical support for multinational forces.

Figure 2



The scheme shown at figure 2 we define as a fragment of comprehensive model of military-medical service – 2010 which is been developing now.

Battle Trauma and DNBI

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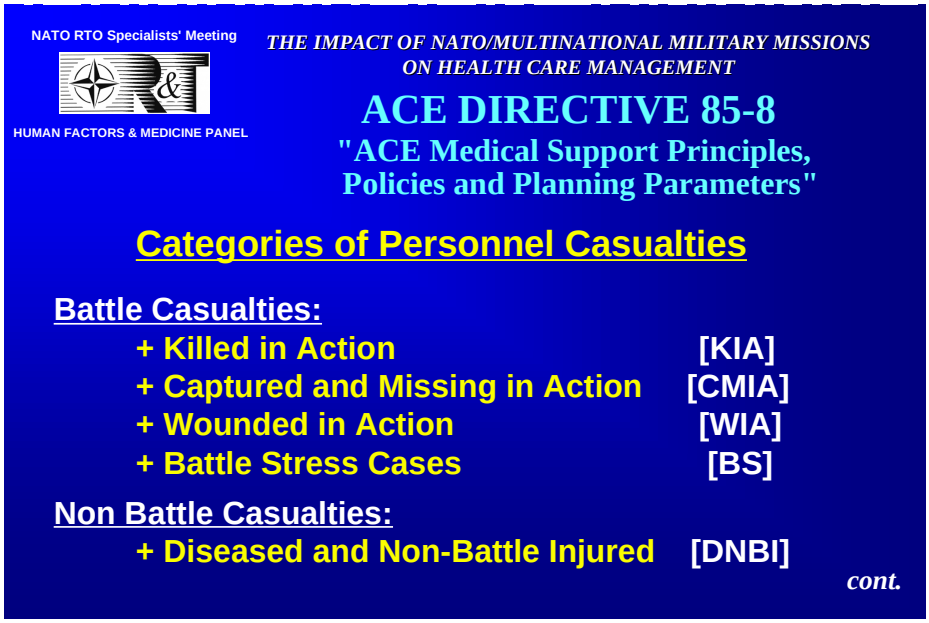
INTRODUCTION

New NATO force structures and strategic concepts emphasise Mobility, Interoperability , Sustainability Jointnes and Multinationality; i.e. deployment of multinational forces to any are for any mission.
The very nature of those operations calls for the likelihood of missions in locations far from those of the sending nations, areas that may have challenging factors of geographical conditions, lack of infrastructure, or indigenous populations suffering from hunger, thirst, epidemic and endemic diseases , trauma or disability. Special environmental and occupational hazards, given in the mission areas have to be considered.
Therefore appropriate Force health protection is a core competency. It must ensure a full spectrum health services that:

- emphasise fitness, preparedness and preventive measures
- improve the monitoring and surveillance of forces engaged in military operations
- enhance service members` and commanders awareness of health threats before they can effect the force and
- support the health needs of the military forces and their families across the continuum of medical services.

CASUALTY PREVENTION

Casualty prevention is essential throughout the health life cycle of service members. During employment, the enemy and the "total" environment both generate threats to the forces. The enemy threat produces most ***combat-related*** casualties commonly called **Battle Injuries (BI)**, while the total environment threat produces ***Disease And Non Battle Injury (DNBI)*** casualties. (fig.1)



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DNBIs historically have accounted for three-quarters or more of battlefield admissions (69 percent in Vietnam, over 95 percent in World War II and Somalia). Prevention of DNBI casualties requires the full commitment of individual service members and unit commanders. The prevention of DNBI casualties historically has focused on reducing or eliminating the risk of food, water, waste, and insect born illnesses, and heat and cold injuries during deployments. However, Operation Desert Shield/Desert Storm demonstrated the need to place a much greater emphasis on environmental and occupational exposures, combat stress and non battle injuries. Comprehensive, continuous military medical surveillance, including collection, analysis, and recording of objectively determined exposure levels, is necessary to counter these non enemy threats, which can dramatically affect the health of military personnel. Following several fundamental tenets of casualty prevention will lower DNBI rates and sustain the health and fitness of the fighting force. These tenets are:

- identifying preventable threats and implementing countermeasures
- infectious disease prevention
- mental health casualty prevention
- total environmental and occupational health casualty prevention
- non battle injury prevention
- risk communication and
- joint health surveillance.

Although disease and non battle injuries have historically caused most of armed forced casualties, battle injuries remain a very significant concern. Services` medical personnel provide support for prevention of **BI** - casualties by anticipating and preparing to counter the adverse medical effects of the enemy's operational threats. Typical support includes such areas as research on the best body armour for conventional weapon threats and measures and substances required to counter biological, chemical, or nuclear weapons effects.

CASUALTIES ESTIMATION

Casualties estimation is the core of medical plans. IN any scenario the analysis of likely casualty rates and numbers has a great political and operational significance and is fundamental in establishing medical support requirements. The casualty estimate is a prediction of total losses of personnel in an operation due to various causes. It is expressed in numbers per day. Casualties are broken down into BC and Non Battle Casualties (Fig.1).
Casualty rate is the operational estimate of the number of BC, which will result from the operation. Casualty rates are expressed as a daily rate (number of casualtiies/100/day). Historically casualty rates give the planners the frame of reference for those rates that can apply to the specific operation. Once the rates have been chosen, they can be applied to the force to be deployed to produce an estimation of casualties(both BC and DNBI).
The process of casualty estimation for a specific operational plan draws on a broad base of knowledge on three linked operational parameters:

- Forces defined by size (the population at risk (PAR), configuration of operation(structural and functional organisation, order of battle and scheme of manoeuvre.
- Time during which a rate is applied
- Operational dynamics visualised as attacker-defender interactions.

The medical planner will support the development of the operational plan by constructing a profile of plausible rates for a given operation, which describes the rate behaviour - pulses and pauses - and their variability over the full force and time. Since plausible and reasonable patterns of rates are associated with the major patterns of operations, the judgements of possible operational results are crucial. The medical planner should realise that casualty estimation, which reflects the ultimate view of what will likely happen along the time line and across the force, is not primarily his responsibility. The responsibility for providing casualty estimates lies with the J3 staff. Projection of operational results should reflect the commander and staff's appreciation of the projected scenario.

With regard to the estimation of BC in PSOs, there is little historical data but, it can be assumed that casualty estimates would be significantly lower and different, in kind and character, than in conventional warfare. In some operations, though no combat would be involved, casualties could result from the military operational environment (e.g. from residual mines, snipers, etc.) and these casualties would be counted as BC.

A detailed analysis of expected sources of DNBI based on historical and current data would enable medical and operational staffs, working in concert, to produce a provisional DNBI rate for the operation. This is a technical estimation of the probable rate of diseases and injures not resulting from combat, which can be expected in the force, once deployment begins. DNBI rate is mission dependent and dynamic, related to the level and nature of activity, the acclimatisation, training and living conditions of the deployed personnel. DNBI rates for generic planning are provided in AD 85-8. The experience gained in recent NATO deployments shows that the AD 85-8 set of occurrence rates remains valid. The implementation of a morbidity surveillance system in NATO deployments will allow NATO to establish a library of health surveillance information that would assist medical support planning for future operations. A comprehensive DNBI analysis could produce more effective preventive medicine measures, including recommended policy on immunisation, prophylaxis and troop education. It could also be a driving factor in the size and capability of medical resources required in different scenarios.

NBC Casualty Estimates. Guidance for the estimation of casualties from nuclear attack can be found in STANAG 2475 NBC/MED. Studies into casualty estimates with regard to biological and chemical attack are being carried out and are published as STUDY 2476 NBC/MED (Biological) and STUDY 2477 NBC/MED (Chemical). When completed and agreed by nations, these studies will form, covered by STANAG 2475, AMedP-8 (A), which will then comprise three volumes.

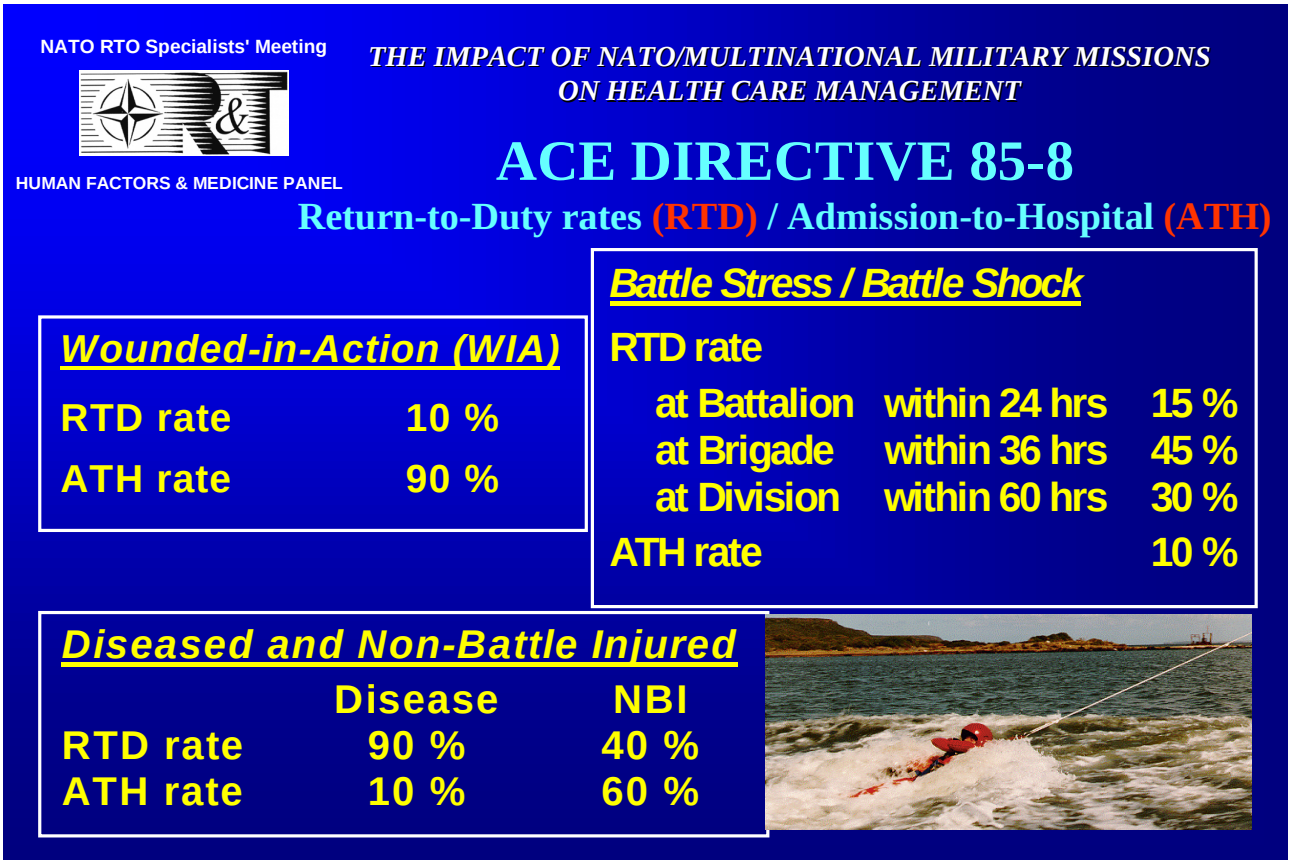
According to the ACE DIRECTIVE 85-8 following Battle casualties for an army mission can be expected

Command Level	**BC Rate**	**BS Rate**	**Total BC Rate**
Battalion	20,5%	4,1%	24,6%
Brigade	6,9%	1,4%	8,3%
Corps	1,4%	0,3%	1,7%
Army	1,0%	0,2%	1.2%

The different categories apply in the following percentages:

-	Killed in action	KIA	17%
-	Captured/missing in action	CMIA	8%
-	Wounded in action	WA	58%
-	Battle stress cases	BS	17%

The return to duty rates (RTD)/ Admission - to - hospital (ATH) rates are given in fig.2



EPINATO - REPORT

Summery of disease and Non- Battle Injuries SFOR, 1999

Due to variability of DNBI reporting within SFOR, data compiled for this report should be interpreted as estimates of morbidity, lost duty days and medical resource usage in 1999. The average incidence rate for all causes of DNBI in SFOR was 86.6 cases per 1000 soldier weeks (range 61.2 - 105.8) in 1999. Disorders of ear nose and throat remains the most frequently reported condition in 1999 with an average rate of 14.9 cases per 1000 soldier weeks. Infectious diseases accounted for over on Quarter of all DNBI events and 40 % of hospital admissions. Dermatological problems was the second most commonly reported condition (11.2). Injuries represent 27 % of DNBI reported, and as a class are the most important cause of light duty days, lost duty days, and specialist consultations.(injuries due to sport (4.1); injuries due to training (2.5); Road traffic accidents (0.6).
Reduction of injuries continues to be a priority and will require not only further investigation into the specific circumstances surrounding injury events, but also command emphasis and the provision of expertise to implement injury prevention plans where needed.

System of Training and Certification of Military-Medical Personnel in Ukraine Armed Forces

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When Ukraine was proclaimed as an independent State, a national system for military-medical education was established. In the early nineties, the conceptual approaches and the structural model for the military-medical personnel training was developed. The tasks, organization, and principles of functioning of the Ukrainian Military-Medical Academy (UMMA) were determined and approved. By that time, there were 34 military educational institutions dislocated in Ukraine, but none of these was engaged in the training of military physicians, or in research in military medicine. All institutions working in these areas were historically situated in the Russian Federation.

In 1992, initial legislative measures were taken by the government of Ukraine relating to the foundation of the UMMA. First of all, the training of military-medical specialists was recognized as one of the basic tasks of the National medical university. Then, the Government took the important decision to establish the Military Medical Department (MMD) as a part of this University.

Undergraduate training, postgraduate training and specialization of military physicians and provisors meeting the State standards were set as the paramount tasks for the MMD. A no less important objective was the postgraduate training of military-medical managers and administrators of the Ministry of Defense, of specialists of civil health institutions working in the field of the State defense and security as well as of the medical corps of the Ministry of Emergency Situations.

An essential part of the MMD's activities referred to the organization and implementation of fundamental and applied research in the field of military medicine. The first students were admitted to the MMD in 1993.

Next, the Ukraine Military Medical Academy was founded on the base of the MMD as an independent training, research, methodical and information center of military-medical service. The present organization structure of the UMMA is shown in figures 1 and 2.

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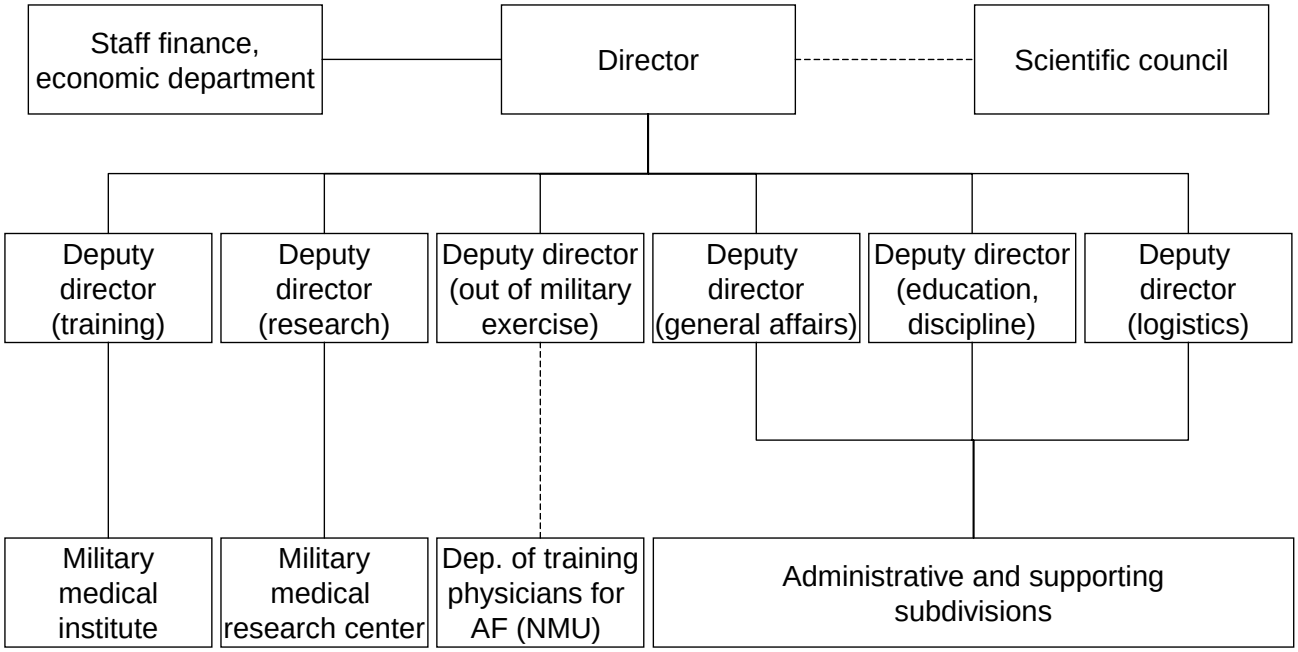

Figure 1. Ukrainian military-medical academy organizational structure

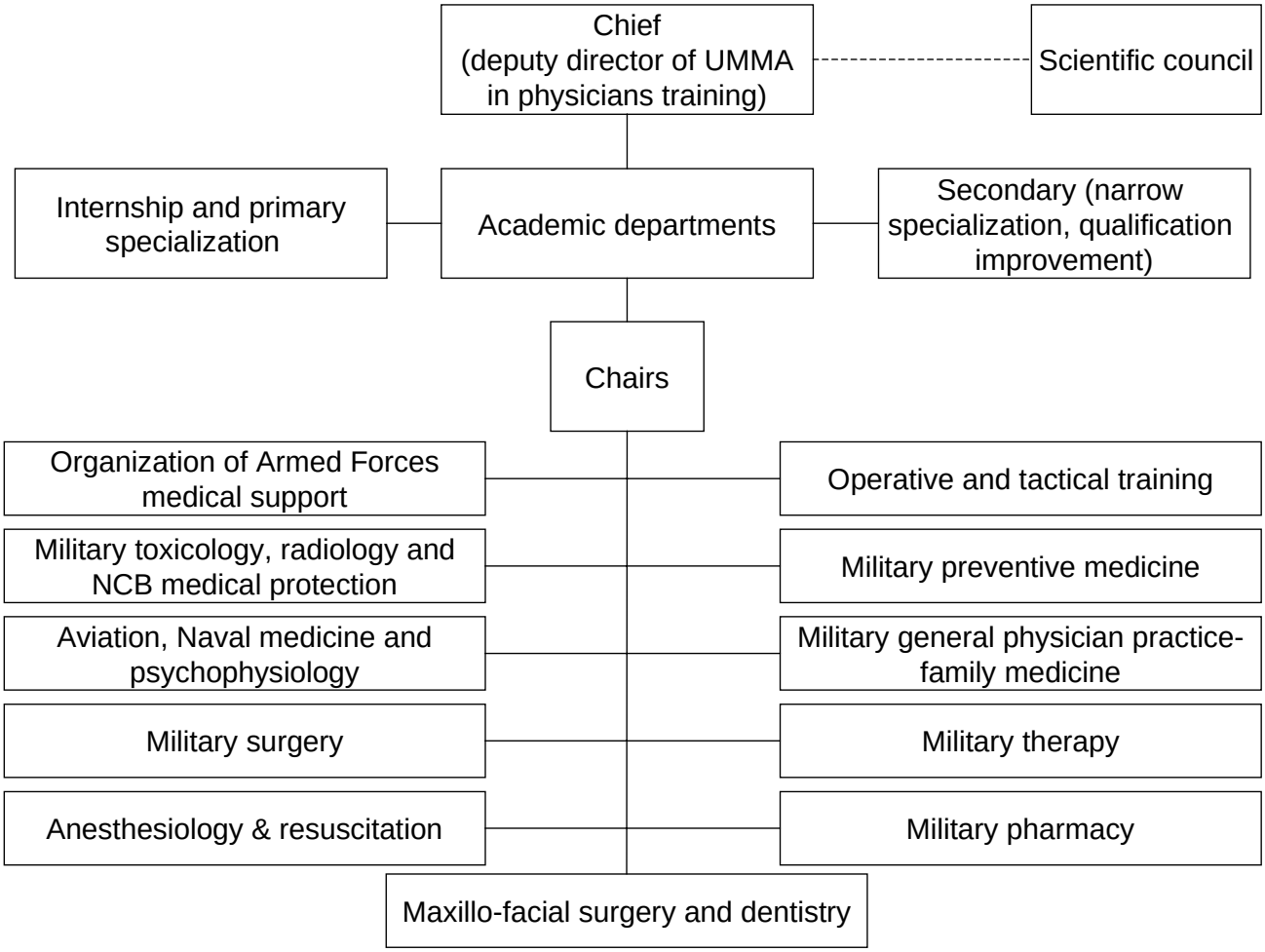

Figure 2. UMMA military-medical institute organizational structure.

Along with the foundation of the UMMA the Ukraine government took two other important decisions concerning the military medical education. The first decision was to introduce compulsory training in military and emergency medicine for students and newly graduated internship physicians of civil medical universities and attendants of institutes of postgraduate physicians training. Chairs of emergency and military medicine have been founded at these institutions.

The second governmental decision was to complete the military medical educational system with two additional components. The undergraduate training of military physicians at the Training Department of Military Physicians for the Armed Forces of Ukraine was established on the base of the National Medical University, and an appropriate department for assistants physicians training was opened at Vinnitsa Medical College.

Presently five interconnected elements of military-medical personnel training have been inplemented:

1. Basic high education, with pre-draft training and personnel orientation – general high school, military lyceum, and nurse school;

2. Undergraduate medical education to obtain the medical doctor diploma – Training Department of Military Physicians for the Armed Forces of the National Medical University;

3. Undergraduate medical education, with courses on Emergency and Military medicine to obtain a medical doctor diploma and the military rank of reserved officer – medical universities of III-IV level of accreditation;

4. The Ukraine Military-Medical Academy – postgraduate military physicians training and specialization;

5. Training of military physician assistants – Vinnitsa Medical College.

The main tasks of Ukraine Military Medical Academy fall into six categories:

1. Postgraduate medical education. It is realized through 2-3-year internship combining with primary (wide) specialization. The latter includes ten basic specialties: general practice, general surgery, internal medicine, anesthesiology, stomatology, pharmacy, epidemiology, hygiene, etc. This stage of physician training is normally completed with a State certification which is equivalent to the license in the Western system of medical education.

2. Selected training on 2-3-year magisterial course for talented graduates. This course is a combination of clinical training and research, and if the candidate passes the complex examinations successfully, he will receive a magister diploma and a medical specialist certificate.

3. Postgraduate (each 5 years) advanced training courses lasting 1-3 months, with a 1-month pre-course exercise, followed by an examination. These course was set up to confirm existing or to get higher a physician qualification degree. Therefore, it is mandatory for each medical doctor.

4. Secondary or narrow specialization in one of the 106 military-medical specialties (ophthalmology, urology, neurosurgery, cardiology, etc.). To obtain a certificate in any of these specialties, the candidate should pass through special advanced course (10 months for a surgeon and up to 6 months for an internist

and a preventive medicine specialist) and a certifying examination which is held at the Military-Medical Academy, the Main Military Clinical Hospital or one of the medical departments of the operative commands.

5. Adjunct research (3-year study, a pre-admission and a post-admission profile examination, preparation of a thesis). This program is completed by defending a thesis at a specialized scientific council of authorized institutes, universities or academies, and a candidate of the medical sciences degree is obtained.

6. Courses for Doctor of Medicine are open to candidates of the medical sciences who have at least five years served as a physician or researcher. After completion of a 3-year research program, the scholar has to defend his doctoral thesis at an authorized specialized council.

Graduates of the medical colleges are distributed to serve as assistant physicians at garrisons or other military-medical facilities. After three years of service, they obtain the right to be admitted to the third year course of the National Medical University with a follow-up postgraduate training at the Military-Medical Academy.

In summary, the system of military-medical education has been legally established in Ukraine. The system functions in full accordance with the current the State legislation standardized credentials and privileges. It is closely integrated into the State system of medical education as its specific and organic component.

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Partnership in Ukraine Ministry of Health and Academy of Medical Sciences Scientific Direction of "Aerospace Medicine"

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The scientific direction of "Aerospace Medicine" was generated in 1996 under the Ministry of Health (MOH) and the Academy of Medical Sciences (AMS) of Ukraine with the purpose:

- To link up the scientific potential of the MOH and the AMS of Ukraine for the solution of fundamental and applied problems of aviation and space medicine;
- To coordinate the partner relationships with establishments of a National Academy of Sciences, National Space Agency, Ministry of Defense of Ukraine and other departments;
- To advance international cooperation.

To realize these objectives, seven scientific commissions have been set up, which cover the following topics:

1. ***Space Ecology (***closed space ecology, environmental monitoring using remote ground probing technologies, space technologies, and the environment of the earth, outer space ecology).
2. ***Space Biotechnology*** (the " virus-cell" system under zero-gravity; production of biologically active substances of enhanced activity and purity; normal and malignant cell selection; studying in yeast genome shifts (for industrial and medical utilization) under zero-gravity conditions; biodamage of industrial structures and materials).

3. ***Space Radiation Medicine*** (radiation safety of crews of space equipment or enterprises using ionizing emissions; space craft electronic circuit protection system against harmful effects of high-energy galactic emissions; health support of the aerospace technology experts; biological dosimetry).

4. ***Space Pharmacology and Toxicology*** (pharmacodynamics and activity of medicines in the space environment; medical support of space flights; toxicology of closed ecological systems).

5. ***Space Biomedicine*** (vector biological processes and gravity, experimental models of human diseases as subject of space biomedicine studies; individual development and space flight factors).

6. ***Telemedicine*** (technologies; medical education; medical science; health care; special spheres of activities).

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7. ***Aerospace Medicine*** (pilots' health; flight safety; rehabilitation in aviation medicine; injuring factors of flight and professional activity of the crewmen; human factor methods and means of research; methods, means and results of pilot examination in simulated flight; vertebroneurology in aviation medicine).

In the past five years, substantial experience has been accumulated in the realization of this objective. The MOH and AMS participate in the National Space Program of Ukraine within the direction 04 "Space biology, biotechnology and medicine". Two research projects are financed within the framework of the MOH problem commission of "Space biomedicine".

1. A study of the mechanisms of developmental disturbances of the bone and muscle tissues of the rat embryo under the simulated space flight factors.
2. A study of the mechanisms of gravity-dependent processes of de- and regeneration of peripheral nerves and synapsogenesis.

As a result of this research, the conceptual aspects of assimilation in space (biomedical problems), and a systemic approach to the study of the influence of space flight factors to living organisms, including man, were formulated. New facts on the influence of space flight factors to developing organisms, on acsone transport in the peripheral nervous system, and on the reproduction system have been obtained. These data can be used in various areas of medicine (occupational diseases, military medicine, traumatology, neurosurgery, etc.).

The main findings of this research have being presented at several scientific seminars and symposia:

- Actual problems of experimental medicine (1997, 1998, 1999)
  (http://www.srlc.nmu.kiev.ua/sec_conf.html http://www.srlc.nmu.kiev.ua/rus/th_conf_r.htm).
- Symposium on Problems of Space Biomedicine (2000)
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- Scientific seminar on « Space biomedicine » (1995, 1996, 1998, 1999, 2000)
  (http://www.srlc.nmu.kiev.ua/spbiomed/seminar_history.htm
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  (http://www.srlc.nmu.kiev.ua/spbiomed/spaceclub_history.htm
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Telemedicine is also rapidly developing. In 1996 – 1998, the concept of partnership in telemedicine was jointly developed with experts of the National Space Agency of Ukraine (NSAU), NASA (USA), the National Medical University and the Institute of Military Medicine of the Ukraine Armed Forces. This

project includes the following topics: technologies, medical education, medical science, public health service, special spheres of activities (space, ecological, military telemedicine, disaster medicine).

The Scientific Research Laboratory Center of the National Medical University established, in 1997, a center for “Telepathologist”, which includes leading oncologists from Ukraine. In 1998, a partnership has been set up between this Center and the Department of Telemedicine of the Armed Forces Institute of Pathology of the USA (AFIP).

Presently, the commission on “Telemedicine” works in tight partnership with the Ukrainian Association of Computer Medicine (UACM). This association was established in Kharkov in 1992. In 1993 it has become a national Member of the International Association of Medical Computer Informatics (• • • •). In 1994, at the IVth European Congress on Medical Computer Science, UACM became a national Member of the European Federation of Medical Informatics. Now UACM integrates 75 research institutes, universities, scientific societies, medical establishments and firms. Experts in the field of medical computer science, medicine and radio electronics from Russia, Belarus, USA, Canada, Japan, Great Britain, France, Poland, Turkey have been included in the Scientific Council of UACM (http: // www.uacm.cit-ua.net). The main results from this collaboration were discussed on a Symposium on Telemedicine (Kiev, 2000; http://www.srlc.nmu.kiev.ua/telemed/index.htm). At the Symposium on Problems of Space Biomedicine, a telebrigde between Ukraine and Russia was for the first time discussed. Experts of the Scientific Research Laboratory Center of the National Medical University, the State Scientific Center of the Institute of Biomedical Problems (Moscow, Russia) and the foundation of "Telemedicine" (Russia) have participated in this project.

The "Aerospace medicine" commission organized, in cooperation with the Institute of Military Medicine (Ukraine) a first International Symposium on Aviation and Space Medicine (Ukraine - Russia - AGARD/NATO), where the following topics were discussed:

- Pilots’ health;
- Flight safety;
- Rehabilitation in aviation medicine;
- Injuring flight factors and professional activity of crew members;
- Human factor: methods and means of research;
- Methods, means and results of pilot study in imitative flight;
- Vertebroneurology in aviation medicine;
- Biological experiments in aerospace medicine;
- Closed space ecology;
- Biodamage of industrial structures and materials;

- Medical and preventive aspects of health-support of the aerospace technology experts;
- Biological dosimetry;
- Toxicology of the closed ecology system;
- Telemedicine.

This Symposium prepared the ground for the development of a long-term partnership between Ukraine and the NATO countries in the field of military medicine and has created the necessary preconditions for the subsequent NATO Human Factors and Medicine Panel activities in Kiev. As a consequence, all conditions are favorable for the further development of partnership interactions between the Ukrainian and foreign experts in the broad field of aviation, space and military medicine.

Perspectives of Telemedicine Development in Ukraine

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INTRODUCTION.

The healthcare system in Ukraine has seen the creation of National Medical Networks and Registers (databases). There are two extensively developed medical networks operating within the framework of the computer network of the first generation 'HealthNet' .

The most ramified of these two is the National Register of the individuals who are suffering from consequences of the Chernobyl disaster. This Register monitors the health of more than 700,000 persons. A computer network has been created in order to maintain this Register, covering 25 districts and cities under direct central administration- Kiev and Sebastopol.

The second most ramified network is the net of the Sanitary and Epidemiological Service of the Ministry of Health of Ukraine which is implemented on the computer centres of the district Sanitary and Epidemiological Service (ca. 70 computer centres), which transmits operative information on the current sanitary, epidemiological and ecological situation to the Ministry of Health of Ukraine. These nets are integrated in a common net called 'HealthNet'.

A third medical network has been created for the monitoring of oncological patients in Ukraine. This network links the regional Oncological Dispensaries (19 regions) with the Institute of Oncology in Kiev, on the basis of which the Oncological Register functions.

Since 1997, Ukraine is a member of the international “EuroTransplant” organization. This medical computer network has united regional Centres with the National Informational - Coordination Centre on Transplantation of Organs, Cells and Tissues, which is located in Kiev.

In connection with the increase in sexually transmitted diseases, including AIDS, regional databases (registers) have been developed in collaboration with the Regional dermatological-venereological Dispensaries, which provide links between the regional dispensaries and which allow to analyse and to predict the tendencies of development of such infections in region and to produce effective measures on their prophilaxis.

In the Kharkiv region, Healthcare information technology (IT) is particularly well developed. The clinical base of the Department of Clinical Informatics and IT in Healthcare Management of the Kharkiv Medical Academy of Postgraduate Education, which is in 5 Central clinical hospitals of Ukrzalisnica in Kharkiv, was the first in Ukraine to create a Telemedical Cardiological Centre, in which the technology of trans-telephone electrocardiography (ECG) has been introduced. All equipment for this technology, including portable ECG amplifiers and modems has been developed and created in Ukraine. Since 1998, the

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teleconsulting medical Centre for the analysis MRI images has functioned at Institute of Neurosurgery of Academy of Medical Sciences in Kiev. At the Kiev National Medical University, the telemedical consulting centre “Patholog” has been organized, in which competent oncologists-cytologists carry out consultations on morphological preparations. The Centre has the possibility to solicit a “second opinion ” from experts of the military hospital in the USA. In 1996, the Ukrainian Association of Computer Medicine (UACM) created a WWW-server in 3 languages: Ukrainian, Russian and English (**http://www.uacm.cit-ua.net**). The UACM members are 81 scientific research institutes, universities, scientific societies, enterprises and hospitals. Over 1500 scientists who are individual members of the UACM have the possibility to use data bases and scientific information on world-wide and Europe-wide medical informatics in Ukrainian and Russian (WWW-servers of EFMI, IMIA, WHO, EHTO European Observatory on Telemedicine), UNESCO and different WWW-servers of IMIA/EFMI (Working and Specialist Groups). The UACM has received an offer and has created affiliate Web- EHTO-UKRAINE server of European Commission on Telemedicine in Ukraine in the national language (**http://www.ehto-ukr.cit-ua.net)**. In 1996, the United Commission on Telemedicine of the Ministry of Healthcare and the Academy of Medical Sciences was created. The Commission co-operates with the UN International Telecommunication Union (ITU) and European Commission on Telemedecine (DGXIII). In July 1998 and September 1999, the UACM specialists took part in the Conference “Telemedecine International Medical Care Networks” in Visby (Sweden) on co-operation and efficient use of resources by building networks within the Baltic Region. In 1998, a Ukrainian-American project on the monitoring of birth defects in Ukraine has been initiated under the initiative of UACM (Read the detailed description of the project at **http://www.uacm.cit-ua.net**).

These medical networks are standalone networks, they are not interconnected. They function with the help of modem communication and inter-city phone lines. It is obvious that technologies, which were used in various medical networks in Ukraine in the last 5-10 years now require significant updating to a modern level.

THE PROJECT GOALS OF ‘UkrMedNet’

At present a national Open Direct Access Medical Network is being created on the basis of the existing HealthNet and some other autonomous medical networks. This project also envisages the integration of all existing separate medical nets, medical universities and medical R&D institutes of Ukraine into one 'UkrMedNet', as well as the creation of a common informational space and its integration into the European one.

The 'UkrMedNet' project is being developed according to the guidelines provided by the Concept of the State Policy on the Health Care IT policy in Ukraine (adopted in June, 1995), by the Order of the President of Ukraine No. 186/93, dated 31 May 1993 “On the State Policy on IT in Ukraine”, and on the decision of the Cabinet of Ministers of Ukraine No. 605 from 31 July 1994 on “IT Problems”.

Presently, preparations are in full swing for a radical reform of the entire health care system in Ukraine. It should be underlined that this health care reform takes place in a country that suffered from an

ecological disaster of a global scale - the Chernobyl disaster. It has affected, and still affects the health of hundreds of thousands of people. It should also be noted that Ukraine occupies 607,7 thousands of sq. kilometres and that it has a population of about 52 million. Under these conditions, state-of-the-art IT offers realistic opportunities to solve all the problems which were mentioned above quickly, effectively and inexpensively.

The basis of the comprehensive medical IT infrastructure is the creation of the national Direct Access Computer Network 'UkrMedNet'. The goal of 'UkrMedNet' is to supply an operational infrastructure for all existing and future medical networks and telemedical consulting centres, and to set up a system for medical and ecological information exchange in and outside Ukraine, based on state-of-the-art communication technologies. The main purposes and problems for the near future are:

- To update the national medical computer network to a state-of-the-art level using advanced computer technologies, communication lines and telemetry technologies, and to integrate it with the Internet.
- To integrate the medical universities and R&D institutes of Ukraine into 'UkrMedNet'.
- To continue the creation, development and maintenance of WWW servers which support the Ukrainian, Russian and English languages, and to provide references to these servers. To integrate the Chernobyl Register net into ‘UkrMedNet’ and to create a WWW server containing the Chernobyl Register information. To provide access to the ‘UkrMedNet’ users to the created WWW servers, and provide this access to all countries (in Europe, both Americas, Asia and Africa).
- To set up Hospital Information Systems (HIS) at various levels (district hospital, regional hospital, specialised institute), equipped with up-to-date telecommunication facilities for transmitting bio-medical signals ((EEG, ECG etc) and medical images (Ro-grammes, MRI, etc.), texts, graphics, audio and visual information, according to telemedecine concepts. To integrate these systems into 'UkrMedNet' and provide an access to the Internet from ‘UkrMedNet’.
- To continue the creation, development and maintenance of data banks on patients requiring organ transplantation and to unite them with the existing cell and tissue data banks within the information-and-co-ordination nucleus of the 'Ukrtransplant' system. To connect the State information system of organ, tissue and cell transplantation in Ukraine with the similar European 'EuroTransplant' system via the Internet.
- To continue training medical specialists to work with telematics applications, and to advocate the utilisation of up-to-date communication technologies in health care. To set up a State or International Training Centre, based at the Department of Clinical Informatics and IT in Health Care Management of the Kharkiv Medical Academy of Postgraduate Education.

- To continue the creation, development and maintenance of servers with information on the following sections:

- Strategically important information on radiological, epidemiological and toxicological monitoring;

- Quick access data bases containing information and instructions on urgent measures in emergency situations;

- Information on the branches of medicine;

- Medical information for the general public, including: diabetes, epilepsy, pregnancy, cardiovascular diseases, healthy way of life and rational nutrition, toxicology and pharmacology, data on prohibited food products, current pharmacological advises, and other relevant information for general public.

- Information from other fields of knowledge necessary for health care (biology, physics, chemistry, etc.);

This will make the vast amount of information, which has been accumulated by the leading R&D and other organisations in Ukraine, commonly accessible. This work forms a part of the National Program for the development of telecommunication means in Ukraine.

The development of the architecture of UkrMrdNet is co-ordinated by the Ukraine Institute of Community Health, which operates under the guidance of the Ukrainian Association Of Computer Medicine (UACM), an organisation whose members work in areas related to the development and utilisation of informational technologies in health care. The UACM has a Scientific Council consisting of 68 leading scientific experts in the fields of medical informatics, medicine, and radioelectronics from Ukraine, N.I.S., USA, Japan, Great Britain, France and Poland. The association with UACM is the best guarantee that the goals and objectives of the project are realised, and that the efforts of the project participants are well co-ordinated.

'UKRMEDNET' ARCHITECTURE.

‘UkrMedNet’ will use the Internet (ISDN) and “Frame Relay technology”. “Frame Relay technology” offers great advantages to telemedicine, which will allow data link data transfer (texts, graphics, images, voice and video) using uniform equipment.

'UkrMedNet' has a three-level structure .

The first level of the Net consists of a National and four/five Interregional nodes. All the nodes of this level have a similar structure and they service 5 or 6 districts (district nodes). These will be connected to the National node, which is based in Kiev. The Ukrainian National node also performs the functions of the interregional node for Kiev and adjacent districts. All Interregional nodes are directly connected to:

a) the national node ; b) one of interregional ones; c) one of Internet nodes which is not a part of the net of the Ministry of Health of Ukraine. This connection layout ensures doubling of the connections of the first level nodes, i.e. ensures virtually 100%-proof data transmission. This enables us to consider the proposed architecture to be highly reliable.

The National and Interregional nodes ensure the connection with the second-level nodes network, as well as direct links with large scientific and medical centres, organisations and universities. The second level of the net includes the regional health care departments. The second-level nodes are connected to the nearest inter-regional node. They ensure connection to the net of medical organisations located in the region.

The third level are district nodes and end users. They are connected to the nodes of the district health care departments. Within the scope of the project, this level is built on the basis of organisations - members of UACM, as well as all health-care organisations willing to join the project at their own expense or at the expense of the Ministry of Health of Ukraine (within the scope of the programme of development of telecommunications in Ukraine).

SUMMARY

The development of the Ukrainian National Medical Network provides possibilities for the exchange medical, ecological and scientific information. Physicians, scientists in R&D institutes and universities will obtain access to the necessary information, receive electronic copies of scientific journals and articles, and are able to run programmes unavailable on their equipment.

The Ukrainian national systems on transplantation of organs, tissues and cells, connected at present with 'Eurotransplant' will be incorporated in the unified European computer system of organ transplantation, thus giving Ukraine a real opportunity to join the progress in this field. The IT will be adapted to the national conditions in order to support organ, tissue and cell transplantation operations on the national and regional levels.

Based on international experience, a technical project will be created with standardised protocols for data bases and solutions, as well as standard programme modules with standard input and output files to be used in central and regional information and analytical systems in order to ensure the functioning of all data bases of a higher level.

Due to the network development the EU countries obtain the possibility to carry out many joint projects together with medical specialists in Ukraine. Thus, the R&D potential will be stabilised.

For a country occupying a vast territory, which finds itself in a dramatic economical situation, it is very important to create consultative telemedical centres. This will make it possible to provide qualified consultative and diagnostic medical aid for the population, primarily for those living in remote rural regions, at a low cost. Therefore, 'UkrMedNet' has a tremendous medical and social significance for Ukraine and will accelerate the integration of the country into the informational space of the world.

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International Military Medical Standardization— Status and Prospects

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SUMMARY: The purpose of this paper is to discuss medical standardization within the international military arena. I will present the driving factors, procedures, and an overview of medical standardization within NATO of importance to PFP nations.

INTRODUCTION:

Good Afternoon ladies and Gentlemen! It's a great pleasure to be with you today, to discuss a matter near and dear to my heart—that of Medical Standardization. I want to make it very clear from the outset, though, that while the general principles I want to discuss today transcend any particular organisation, the details I will be presenting are specific to NATO and to its involvement with the Partnership For Peace nations. There are other organisations involved in development of medical standards which may affect the military, such as the International Standards Organisation (ISO), the Air Standards Coordinating Committee (ASCC), and the ABCA Quadripartite Working Group, but I am not attempting to discuss their structures or procedures. Whenever possible, we in NATO attempt to make use of the standards developed by such other organisations, but generally speaking there is no direct interrelationship.

DISCUSSION:

What I want to discuss today is a series of questions: What is standardization in the NATO context? Why do we need medical standardization?; How do we do it?; and, What do we attempt to standardize?

So, what is standardization? ---"Within NATO, it is the **process** of developing concepts, doctrines, procedures and designs to achieve and maintain the most effective levels of compatibility, interoperability, interchangeability and commonality in the fields of operations, administration and materiel."

That being said, it must be recognised that, within NATO, there is no belief that all our nations must do everything exactly the same way. While there are some areas for which total interchangeability is needed (such as ammunition), it is obvious that many other areas of concern do not need to be totally interchangeable. In fact, this is recognised, in that there are four levels of standardization which may be considered acceptable in differing circumstances:

- **COMPATIBILITY,** defined as "My System (or procedure) does not interfere with yours".
- **INTEROPERABILITY,** defined as "My system (or equipment) can talk to yours".
- **INTERCHANGEABILITY,** defined as "My equipment items can be exchanged for yours without modification".
- **COMMONALITY,** defined as "We utilise the same doctrine, procedures, or equipment".

Actually, to simplify this issue, NATO is working on a changed nomenclature which will have only three recognised levels of standardization, which are:

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• **COMPATIBILITY** ("The suitability of products, processes or services for use together under specific conditions to fulfil relevant requirements without causing unacceptable interaction".)
• **INTEROPERABILITY** ("The ability of one product, process or service to be used in place of another to fulfil the same requirements".)
• **COMMONALITY** ("The utilisation of the same doctrine, procedures or equipment".)

You will note that essentially this proposed new definition will amalgamate the current two categories of "Interchangeability" and "Commonality", which are seen as having a major area of overlap at present.

It is important to understand that for a piece of equipment, or for a force structure to operate effectively, different elements may need to be at differing levels of standardization. To achieve cost effectiveness it is important, when defining a requirement, to establish the minimum level which will achieve the aim. For example doctrine, terminology and legal aspects should be on the level of **commonality**, ammunition on the level of **interchangeability**, with communication and weapon systems on the **interoperability** level.

The Guiding Principles for standardization within NATO are:
- Standardization is voluntary—no nation can be forced to agree to standardize anything. They will do so only if they agree that it is in the interests both of the Alliance and of the nation.
- It is not an end in itself—we do not attempt to standardize equipment, policy, or procedures simply to do so. It is desirable only if it increases operational effectiveness and efficiency in the use of resources.
- Some degree of standardization is essential for implementing plans.
- Other degrees of standardization may be desirable if they enhance the implementation of plans or enhance resource management.
- Interoperability is the minimum level which is desirable.
- Equipping forces is a national responsibility. NATO as an organization does not own much equipment or forces, most of which belong to the nations.
- Common terminology is essential. In fact, it is the bedrock of standardization.

Given that introduction, I think it would be useful to swiftly cover the types of issues which have successfully been standardized within NATO. These generally fall into three categories:

- Operational, including military practices, procedures, and formats (This category applies to doctrine, tactics, training, logistics, etc.);
- Materiel Specifications, including engineering or production codes, systems, components, and consumables; and
- Administrative, including terminology in all fields as well as non-military administration

In recent years there has been an increased interest on the part of the nations in medical standardization, which has resulted from changes in the geopolitical scenario.

As you are no doubt aware, during the cold war NATO's forces were lined up essentially shoulder to shoulder along the inter-German border. Each force was logistically self-sufficient, and interaction between the subordinate elements of these various corps was planned to be limited except along the corps boundaries. For the most part, logistics (including medical support) was considered to be a strictly national responsibility. Accordingly, NATO's medical structure developed along strictly national lines, with only limited interest in inter-operability. Each nation planned to provide its own medical support to the maximum extent possible, from the front lines back to the home country. Nations deploying their forces over long distances (particularly the United States and Canada) did plan to make use of some host nation medical support in the countries they deployed through, but once in combat, they too planned strictly national medical systems. Thus, though medical standardization was carried out to some degree, it generally had limited priority and applicability.

When the Berlin wall came down, and the Soviet Union disintegrated, there developed a new concept of defense within NATO, which obviously affected medical support. No longer was the primary threat

considered to be Soviet tank armies thundering through the Fulda gap. Instead, the threat was seen to be that of instability. On NATO's flanks, failed states and ethnic conflict threatened the peace, with conflicts which threatened to spill over into NATO territory.

To deal with this new threat, and in light of lessons learned from ongoing operations in the Former Republic of Yugoslavia, NATO has developed several new concepts of operations, such as the Combined Joint Task Force (CJTF). I will not discuss these today, except to note that these new concepts require new medical support structures and policies. No longer can each nation plan to "go it alone"-- sharing of resources and multinationality has become the goal in medical support as in combat power. In this new age, we foresee that medical support in an area of operations may be very complex. In addition to some strictly national structures and capabilities, we anticipate an increased use of multinational support, to include lead nation, role specialisation, and true multinationality. Increased use of host nation support may be possible, if such resources are available within the area of operations, and if they are of appropriate quality. Increased coordination with other multinational organisations (such as the UN) and with private non-governmental organisations will be a necessity.

An excellent example of the need for standardization in this new role is a potential scenario in Kosovo, where we have a multiplicity of medical assets, most of which are not mutinationally integrated. Let's look at a case in which a severely injured Kosovar patient receives first aid from NGO or UNMIK personnel, is transported in a Russian ground ambulance, receives surgical stabilisation in a Greek Role 2+ facility, and is then transferred by American Helicopter to a Role 3 hospital operated by the United Arab Emirates. Excluding strictly clinical care issues, there are innumerable areas in which this involved process can go wrong. As only a few examples: Intravenous administration sets may not be interchangeable, requiring replacement of catheters; medical documentation may not be intelligible between facilities, thus leading to loss of vital patient medical information; lack of communication protocols may lead to delays in transport or treatment; patient regulation systems may not be developed, so the patient may arrive at a facility which cannot care for his needs; litters provided by one nation may not fit retaining devices in another nation's vehicles, thus requiring numerous transfers of the patient from one litter to another; etc. Avoiding this type of problem is the purpose for which NATO produces medical standardization.

As long ago as the Crimean War, The esteemed Russian military surgeon Pirogov wrote that "It is not medicine but the organisation which plays the main role in medical aid for the wounded in war". Generally speaking, we agree with this. Accordingly, the vast majority of our effort in medical standardization has been in the administrative and materiel realms, rather than in the area of clinical care.

Unlike many other weapons systems our nations have to deal with, we medics have it easy—our major weapons system is already pretty well standardized. From the standpoint of medical care itself, most Western World Care is pretty well standardized too, and the parts that aren't tend to be pretty interchangeable. While some nations would prefer to perform early intramedullary "rodding" of a femur fracture, and others may prefer to use external fixators, both systems work well—it is only in recent years that the issue of which system is used has become of interest to other nations, as it becomes more likely that patients will eventually be cared for in hospitals other than from their own nations.

Thus, we in the NATO medical forces have concentrated for the most part on materiel and procedural standardization, rather than on direct patient care. We have very few standards on "how to do it" clinical practices, though as we work more and more with non-NATO nations in recent years we are finding that we must develop more of these—some currently being developed or improved include emergency medicine procedures, treatment of climatic injuries, improved immunisation requirements, the use of standardized external orthopedic fixators, and preventive medicine procedures.

For purposes of this presentation, I don't see any great need to go into significant details about the procedures by which NATO develops standardization policies. For most of you, this would be pretty irrelevant, and is subject to change. The basic principles, however, are crucial to your understanding of how we do business.

We have a very complex system, with many players in this field. The first is the Military Committee (MC), supported by the International Military Staff (IMS) and some high level committees like the Senior NATO Logisticians Committee (SNLC) and the Chiefs Of Military Medical Services in NATO (COMEDS), which deals predominantly with operational and procedural matters. The second major player is the NATO Command Control and Communications Agency (NC3A) for Command Control and Communications CIS systems, protocols, and formats. The third one is the Conference of NATO Armament Directors (CNAD), which is the leading agency in the area of equipment and materiel development. These committees are at the policy level and have subordinate groups or agencies working on the doctrinal level such as Military Agency for Standardization (MAS) for the MC, the NATO Army, Air and Naval Armaments Group under the CNAD and Sub-Committees under the NC3A. Operational standardization has often an impact on materiel standardization and vice versa. Coordination between those is essential and is carried out by the NATO Standardization Organization (NSO), or in the future by the NATO Standardization Agency (NSA). Note: The new NSA is planned to be operational by October 2000. The new structure will not have any changed effect on operational standardization, and will remain under the control of the Military Committee.

The process of standardization has no end; it is a continuing process. A nation or work group identifies an issue which they believe needs standardization. This proposal is then validated by the nations, and a custodian nation or group is identified to produce a draft agreement. After a series of study drafts, when a final draft document is believed to be ready to become a standard, it is forwarded to the nations for ratification. When an adequate number of nations have ratified the document (this number many vary depending upon the importance of the issue or the number of nations which have interests in this area), then it is promulgated as an official NATO document. All documents are reviewed regularly, and if needed, amendments are proposed through a repetition of the same process.

Once approved by the nations, these decisions are published as standardization documents, of which the most important are Standardization Agreements (STANAGs) and Allied Publications (APs)—Most medically-related Allied Publications are titled Allied Medical Publications or AMedPs. All ratified and promulgated STANAGs must be nationally implemented by those nations which have ratified them. The national implementing document can be a national directive, order, manual, instruction or other publication. It can also be the original or translated NATO STANAG with a national covering document. One other type of document you may hear of is the EXTAC. This category of APs is essentially comprised of extracts from non-releasable documents, which have been specially designed for use with non-NATO nations to facilitate cooperation in exercises or operations.

I'm not going to go into more details as to the internal mechanisms for approving standardization documents, except to note that there is an intricate mechanism to: identify an area in which there is a need for standardization; develop a draft document; revise it as needed to meet national and alliance needs; and finally gain ratification from the nations, after which it becomes an official NATO document.

So, what have we done in the field of medical standardization? There are currently more than 130 Medical or medically-related NATO Standardization Agreements or STANAGs either already promulgated or under development, ranging from equipment specifications to operational procedures. You certainly do not need to know about all of them at this time, but the MAS Working Groups have recently been tasked to produce a list of "Essential STANAGS" which non-NATO nations should adopt before participating in a NATO-led operation. I will not go through each of these in detail, but will simply mention some of them to give you an overview of what medical standardization is all about, and how important compliance with these documents will be in the context of a multinational medical operation.

The "Essential List of STANAGS" includes the following agreements (note that numbers with an * are not yet ratified, but are in the final stages of development and are expected to be ratified in the relatively near future—they will be available to Partner nations for consideration soon after they are promulgated.):

***STANAG 1412-- "Minimum Standards For A Litter To Transfer Patients Ship to Ship or Ship to Air"**—This agreement establishes minimum requirements for size, weight, durability and casualty protection for ship to ship or ship to air transfer litters for use by NATO Naval forces.

STANAG 2037-- "Vaccination of NATO Forces"-- The agreement considers the protection of armed forces against certain infectious diseases as an essential precaution. Participating nations agree that their armed forces are to be protected against the diseases and in line with the procedures detailed in the annex.

STANAG 2040-- "Stretchers, Bearing Brackets and Attachment Supports"-- This agreement establishes criteria to:

- Achieve interchangeability of stretchers used by NATO Forces.
- Ensure that means of suspension and fixtures used within suitable forms of transportation can receive and secure these stretchers.
- Ensure that restraining aids which safely keep the patient in the required position and prevent undue movement are available.

STANAG 2048-- "Chemical Method of Insect and Rodent Control (AMEDP-3)"-- This agreement registers national acceptance of AMEDP-3. Participating nations agree to use AMEDP-3 as the reference document on Chemical Methods of Insect and Rodent Control used within the national Armed Forces. AMEDP-3 contains the following information:

- Agents used.
- Aim of application.
- Mode of application.
- Effective compounds.
- Indications of necessary precautions.
- Addresses and names of manufacturers.
- National identification/supply-code/number.
- National laws and/or regulations restricting the use of agents or methods.

STANAG 2050-- "Statistical Classification of Diseases, Injuries and Causes of Death"-- This agreement standardizes, for the use of the NATO forces, the statistical classification of diseases, injuries and causes of death. Participating nations agree to adopt the method described for reporting and documenting such information.

STANAG 2061-- "Procedures for Disposition of Allied Patients by Medical Installations"-- This agreement establishes procedures for disposition of allied patients by medical installations in the NATO forces. Participating nations agree to use these standard procedures for disposition of allied patients or other personnel provided care.

STANAG 2068-- "Emergency War Surgery" -- As one of the few documents addressing clinical practice, the aim of this agreement is to:

- Standardize the general principles of emergency and/or first surgical treatment of war-wounded and provide standard medical measures.
- Produce a guide for the medical services of all NATO forces.

STANAG 2122-- "Medical Training In First-aid, Basic Hygiene and Emergency Care"-- This agreement identifies and requires the minimum scope for first-aid and basic hygiene training for non-medical personnel and ensures that certain procedures for the training of qualified auxiliary medical personnel are standardized and can be carried out by the armed forces personnel of each NATO nation concerned.

STANAG 2131-- "Multilingual Phrase Book for use by the NATO Medical Services (AMEDP-5)" -- This agreement registers national acceptance of AMEDP-5. Participating nations agree to use AMEDP-5 as a manual to provide, in all NATO languages, common names for injuries and diseases, words, idioms and phrases indispensable for the correct understanding between medical personnel and patients of different nationalities.

STANAG 2132-- "Documentation Relative to Medical Evacuation, Treatment and Cause of Death of Patients" -- This agreement establishes common procedures and standardized documents for the reporting of patients' initial treatment, en route identification and care, information concerning the patients of other nations and medical cause of death. The participating nations have agreed to standardize:

- A Multinational Field Medical Card, which provides documentation of first aid, initial medical treatment, care in transit, and identification of patients (casualties
- A procedure for reporting on allied patients to parent nations.
- A medical report of cause of death.

STANAG 2136-- "Minimum Standards of Water Potability In Emergency Situations"-- This agreement establishes minimum requirements for potability of drinking water to be used by NATO Forces during operations or under emergency conditions. Requirements and criteria are provided for both short- and long-term field water consumption.

***STANAG 2145-- "Evaluation and Control of Personnel Exposure to Radio Frequency Fields - 3 kHz to 300 gHz"--** The aim of this agreement is to protect personnel engaged in NATO operations from exposures to Radio Frequency (RF) fields, at levels that may be hazardous to health. Participating nations agree to:

- Use the definitions included.
- Apply exposure limitations and protection principles as stated in the document to prevent harmful effects to personnel exposed to electromagnetic fields.
- Take into consideration the hazard evaluation required by the document.
- Follow standard procedures in the case of alleged or actual overexposure to RF fields.
- Use standard signs, subject to operational requirements, to identify areas where RF field levels exceed, or may exceed, the Permissible Exposure Levels (PEL).

***STANAG 2227-- "Military Medical Support in Disaster Relief"--** This agreement registers national acceptance of AMEDP-15. Participating nations agree to use AMEDP-15 as a manual to provide the guidelines and principles for military medical assistance in humanitarian and disaster relief operations in a peacetime environment.

***STANAG 2228-- "Allied Joint Medical Support Doctrine (AJP-4.10)" --** This agreement registers national acceptance of AJP-4.10. Participating nations agree to use AJP-4.10 as a manual for joint medical support doctrine in NATO- led operations.

STANAG 2350-- "Morphia Dosage and Casualty Marking"-- This agreement standardizes within the NATO Forces the range of initial dose of Morphia to be administered to combat casualties, and the method of recording the event. Participating nations agree that Morphia intended for administration to combat casualties will be supplied to the NATO Forces in the dose range shown herein, and that the event of Morphia administration will be recorded as described in the STANAG.

STANAG 2358-- "First-Aid and Hygiene Training In NBC Operations"-- This agreement establishes the minimum first-aid and hygiene training required for non-medical personnel during NBC operations.

STANAG 2361-- "Minimum Essential Medical Supply Items in Theatres of Operations" -- This agreement identifies minimum essential medical supply items which are required by NATO Forces in a theatre of operations.

STANAG 2409-- "NATO Glossary of Medical Terms and Definitions (AMEDP-13)"-- This agreement registers national acceptance of AMEDP-13, which includes standard definitions of medical terminology used within the NATO community.

***Study 2475—"Planning Guide for the Estimation of NBC Battle Casualties (Nuclear) - AMEDP-8, Volume I"**

***Study 2476—"Planning Guide for the Estimation of NBC Battle Casualties (Biological) - AMEDP-8, Volume II"**

***Study 2477—"Planning Guide for the Estimation of NBC Battle Casualties (Chemical) - AMEDP-8, Volume III"**

***Study 2478—"Medical Support in A Nuclear, Biological and Chemical Environment "**

STANAG 2481-- "Medical Information Collection and Reporting"-- This agreement standardizes the collection and reporting of medical information by NATO members. Participating nations agree to use the General Medical Information Report and Hospital Data Sheet for medical information gathering.

STANAG 2500-- "NATO Handbook on the Medical Aspects of NBC Defensive Operations (AMEDP-6)"-- This agreement registers national acceptance of AMEDP-6. Participating nations agree to use AMEDP-6 as a medical officer's guide on medical aspects of nuclear, biological and chemical defensive operations. **This document will soon be broken down into three volumes, which will be published separately as:**

> ***Study 2461—"NATO Handbook on Medical Aspects of NBC Defensive Operations (Nuclear) - AMEDP-6(C), Volume I"**
>
> ***Study 2462—"NATO Handbook on Medical Aspects of NBC Defensive Operations (Biological) - AMEDP-6(C), Volume II"**
>
> ***Study 2463—"NATO Handbook on Medical Aspects of NBC Defensive Operations (Chemical) - AMEDP-6(C), Volume III"**

STANAG 2871-- "First-Aid Material For Chemical Injuries" -- This agreement establishes a basic list of material which must be available to provide for the treatment of chemical casualties.

STANAG 2879-- "Principles Of Medical Policy In The Management of A Mass Casualty Situation"-- The aim of this agreement is to standardize the principles of the medical management of mass casualties for NATO forces.

STANAG 2931—"Orders For The Camouflage Of The Red Cross And Red Crescent On Land In Tactical Operations" -- This agreement establishes policy for determining when the protective symbols of the Geneva Conventions may be camouflaged.

STANAG 2939-- "Medical Requirements For Blood, Blood Donors and Associated Equipment" -- The aim of this agreement is to protect blood donors as well as recipients, when blood and blood products are exchanged between NATO Forces, by introducing uniform medical requirements for blood donors and regulations for transport and storage of blood. The scope of this agreement does not cover all medical conditions and tests that could be useful in selecting donors or assessing the quality of the blood. Participating nations agree:

- That blood and blood products used for transfusion in their Armed Forces should be collected, processed, transported and stored in compliance with the medical requirements described in this agreement.
- To adopt standardized blood transfusion equipment, including blood taking and blood giving equipment used for transfusions of human blood and its derivations or other infusion fluids, so that they are interchangeable and meet cross-servicing requirements.

STANAG 2954-- "Training of Medical Personnel for NBC Operations"-- This agreement lays down requirements for the additional training of medical personnel for NBC operations. Participating nations agree to use the annexes as the basis for producing training programmes for medical personnel. This agreement does not alter in any way national responsibilities in training medical personnel to the standards agreed in STANAGs 2150 and 2358.

STANAG 2982-- "Essential Field Sanitary Requirements"-- This agreement standardizes essential field sanitary requirements for NATO forces.

STANAG 3114-- "Aeromedical Training of Flight Personnel"-- This agreement identifies the minimum training required for flight personnel in order to promote flight safety and efficiency in the operation of military aircraft. Participating Nations agree that flight personnel shall receive, as a minimum, the initial and continuation aviation medicine training detailed in this STANAG.

STANAG 3204-- "Aeromedical Evacuation"-- This agreement establishes the terminology, procedures, training and equipment used in the aeromedical evacuation of sick and wounded personnel, in order to facilitate the transport of patients of one NATO nation in the aircraft of any other NATO nation. Participating nations agree that the provisions detailed in the Annexes will be applied as minimum requirements in the aeromedical evacuation of personnel.

STANAG 3318-- "Aeromedical Aspects of Aircraft Accident /Incident Investigation"-- This agreement identifies the essential points to be covered in the aeromedical investigation of accidents and/or incidents in order to facilitate the exchange of comparable information between nations.

STANAG 3474-- "Temporary Flying Restrictions Due to Exogenous Factors Affecting Aircrew Efficiency"-- This agreement stipulates the minimum temporary restrictions to be placed upon aircrew following exposure to certain physiological conditions. The use of modern aircraft requires the optimal physiological and psychological fitness of the aircrew. Apart from pathological conditions, fitness may be adversely affected by a variety of exogenous factors, the effects of which may be imperceptible and therefore negligible in everyday activities. However, these same factors may have a considerable effect on aircrew efficiency. The main factors to be considered are he administration of pharmaceutical substances to ambulant patients, immunisation procedures, blood donation, decompression chamber runs, centrifuge runs, diving, strenuous physical activities and exposure to chemical warfare agent simulants. Participating nations agree to apply, as a minimum, the restrictions contained in this agreement.

STANAG 3526-- "Interchangeability of NATO Aircrew Medical Categories"-- This agreement establishes the medical procedures for the exchange and assignment of aircrews among nations.

STANAG 3527-- "Aircrew Flying Time And Rest Periods"-- This agreement establishes guidelines for the maximum allowable flying hours and compulsory rest periods for aircrew.

STANAG 3744-- "Minimum Requirements of Medical Equipment In Search and Rescue (SAR) Aircraft"-- This agreement provides a standard list of minimum medical equipment to be carried on board NATO military SAR aircraft.

STANAG 3745-- "Medical Training For Search And Rescue (SAR) Personnel"-- This agreement establishes the scope of training of search and rescue (SAR) personnel and ensures that certain procedures for the training of qualified personnel are standardized and can be carried out by the armed forces personnel of each NATO nation concerned. The target population is SAR personnel responsible for handling and treating patients in flight.

Even realising that this list is only a small part of the overall body of medical standardization documents, you can see the wide-ranging scope of our efforts. Equally, I hope that the benefit of such a program in the context of multinational medical operations is obvious to you. I need to point out that we currently have multinational medical units actually operating in the Former Republic of Yugoslavia, and more are currently under discussion. Standardization of techniques, procedures, and equipment has certainly facilitated this effort. Without medical standardization, we could not accomplish the medical mission of providing medical care to our soldiers of a quality which they need and deserve. I strongly recommend to each of you that you investigate the degree to which your nation has ratified, and more importantly implemented, these agreements.

CONCLUSION:

In conclusion, I would simply like to note that:

- Standardization has increased operational medical compatibility within NATO;
- Our greatest success to date has been achieved in procedures, doctrine, and consumables, not in clinical guidelines;
- Most of the medical standardization documents are now available to Partner nations, and for those few which are not, EXTACs offer the PfP nations a practical vehicle for standardization with NATO.

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Immunogenetic Approach to Prognosis of Military Specialists' Health Status

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The dispensary system is the basis of the curative-preventive support of military personnel in the Armed Forces of Ukraine. The main purpose of this system is to take preventive and medical-diagnostic measures, directed to health preservation, maintenance and recovery. An additional important task is the medical selection of servicemen and military specialists for particular professional activities, and also the dynamic monitoring of the health of these groups.

Today, the Ukrainian army uses combat and technical equipment and installations which contain sources of ionizing and electromagnetic radiation, toxic components and other health hazards. Moreover, many military units are deployed in parts of Ukraine which have been polluted with radionuclides deposited as a consequence of the Chernobyl Atomic Power Station accident. Therefore, an adequate selection of military specialists who have to work in adverse professional and ecological environments is a very urgent and complicated issue for the military-medical service, and this requires new organizational and methodical approaches and essential expenses.

In the Ukraine military-medical services, there is a system in place which regulates the medical selection of military specialists who are in contact with sources of ionizing radiation or toxic substances. This system includes special medical examinations, the establishment of norms for permissible levels of ionizing radiation or toxic substances in a given working environment, individual and collective protection and decontamination measures, and other provisions.

However, as was established, servicemen and military specialists with a similar health status who work in the same occupational and environmental conditions, may show considerable individual variation in their resistance to toxic factors. Exposure to these factors has resulted an increased morbidity and incapacity among specialists with a poor health status. This has caused significant expenditures.

Therefore, it was deemed necessary to develop a radically new approach to the selection of military specialists who work in adverse environments. This approach should be aimed at the detection, before any exposure has taken place, of individual markers of the sensitivity or resistance of healthy persons to damaging environmental factors. In addition to the selection and dynamic observation of the health status of military specialists who are exposed for a long time to toxic influences, more attention should be paid to the early, pre-clinical detection of physiological disorders by implementing regular medical examinations. It is necessary to identify risk- groups and to carry out timely medical-preventive measures.

A joint scientific project, in which medical specialists of the Research Institute of Military Medicine of the Ukraine Armed Forces, the Main Military Clinical Hospital and the Research Center of the National Medical University were involved, has resulted in the development and introduction of new principles for the

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medical selection and dynamic monitoring of the health status of military personnel who are exposed to ionizing radiation, toxic substances or other health damaging factors. The most important aspect of this new methodology is its unified approach to the prognosis of the health status of military personnel. This approach is based on the detection of individual genetic markers , "the genetic passport", which determine the status of the main homeostatic systems in the body (nervous, immune and hormonal). These genetic factors the manage direction and intensity of adaptive responses, and thereby determine individual predispositions to the development of certain pathological processes under the influence of hazardous factors. The great value of this approach is that it is universal, economic, and that it provides both a long-term and a short time prognosis of the health status and performance capability.

The immune-genetic approach for the medical selection of military specialists is based on the evidence that the genetic system of Human Leukocyte Antigens (HLA) - the major histocompatibility complex – plays a leading role in determining human individuality, and in the control of the biochemical and physiological body responses and of the antigenic spectrum of proteins, enzymes, nucleic acids, antioxidants. Many studies have identified genetic HLA markers as the determinants of the relative risk for pathological processes and the development of immune disorders, for the susceptibility to the pathogenic microorganisms, etc. Associations of "HLA and disease" give the possibility to use the HLA-markers ("genetic passport") in the long-term monitoring of the health status and the predisposition to given pathologies. The great number of associations of the HLA-antigens with various diseases has recently been estimated and documented. Thus, when we know a person's set of HLA-antigens we can predict the probability of the development of certain pathological processes, the susceptibility to specific harmful factors, medicines, etc.

Our research was directed to the identification of the immuno-genetic markers of the susceptibility to low doses of ionizing radiation as well as toxic substances, which may predispose military personnel working under extreme conditions to develop pathological reactions and diseases.

We first studied the distribution of particular HLA-antigens and analyzed health status indices among carriers of particular set of HLA – antigens specific exposure. As a first step, the objective physiological indices were selected which reflect disturbances of the health status in the pre-clinical stage of diseases. Once this set of physiological parameters, indices of biochemical and immune homeostasis, cell metabolism, receptors expression, and cytokine synthesis has been determined, the most sensitive indices are selected and compared with the presence of certain HLA-antigens. This type of testing is only used during the first phase of the research to identify particular HLA-antigens associated with individual susceptibility or resistance to the harmful factors or his predisposition to some diseases.

In the second phase, HLA-markers are used as independent criteria for illness prognosis and for the determination of the individual response to the damaging factors without any other additional examination. This selection procedure is cheap, takes just a few hours and it consists only of determining the genetic passport and the assessment of the health risk degree.

This approach we have used for the professional selection of military specialists.

In phase 1, we selected a number of physiological, biochemical, biophysical and immuno-genetic indices which allow to detect early changes in the person's health status under certain ecological and occupational conditions. More than 400 military and civil subjects living in Central–Ukrainian were examined. Among them were healthy subjects, subjects who had previously been exposed to low doses of ionizing radiation (LDIR) or to toxic substances, and patients with various somatic pathologies. The control group included healthy subjects and patients with similar pathologies, who lived in non-polluted regions of Ukraine and who had not been exposed to harmful occupational factors.

The findings indicated that military personnel living in territories polluted with radionuclides or which had been exposed to LDIR had the following patterns of early changes in health status:

1. A tendency to the development of immunodeficiency was typical for participants who took part in the cleanup operations following the Chernobyl accident. This immunodeficiency can transfer into an autoimmune reaction in the case of the development of any somatic pathology. Moreover, anti-prooxidant disorders, leading to the development of many pathological processes have been observed.

2. The autoimmune type of immunogramme with tendencies to develop allergies and high autoimmune responses was observed among military personnel living or working in polluted territories of Ukraine, and those exposed to LDIR. As manifested by the lipid metabolism in the blood and cell membranes, the development of atherosclerosis was demonstrated in these persons.

A large-scale immuno-genetic analysis was carried out and it was found that under the influence of LDIR, there are specific associations of certain HLA-antigens with increased risks for health disorder. It was established that the following HLA-antigens should be considered as risk factors for military specialists working under LDIR exposure: A2, A9, A10, B8, B12, B14. Resistance to radiation exposure is indexed by A3, A19, B7-antigenes. The associations of A3-B5, A3-B8, A2-B7, A19-B12 indicate low resistance of the individual to LDIR. Individuals who are carriers of A10, A12 and B8- antigens in the phenotype have an increased risk for the development of inflammatory and free radical injuring processes.

We also determined immuno-genetic criteria for the prognosis of the health of military personnel which participated in dismantling ballistic missiles (FOM). Is was established that the susceptibility to components of liquid rocket fuel increased when there were low initial levels of antioxidants and high concentrations of poliunsaturated fatty acids in the cell membranes and the blood. All military personnel that was investigated, had an immune dysbalance and the functional activity of their lymphocytes was suppressed. This creates the conditions for the development of immunopathological syndromes and somatic diseases.

After finishing their work, military personnel which had been exposed to components of rocket fuel showed a marked increase of autoantibody production and cell hyperreactivity to lung and liver autoantigens. These are unfavorable prognostic markers, which indicate that there may be damage of the cells of the given organs due to components of fuel, as well as deep changes in the immune response to "self" antigens.

Disorders of lymphocyte function are early markers of immune dysbalance in military specialists. This can cause various pathological process in personnel exposed to LDIR. Probably, both factors have an unspecific stress-dependent impact to the immune system, thereby causing similar patterns of pathogenic changes. Rocket fuel components, however, also exhibit a toxic effect which is characterized by damage of the liver cells and the development of autoimmune disorders. Repression of the antioxidant protection is another early pathogenic element in the chain of many pathologic processes. Carriers of A10, A12 and B8-HLA-antigens who were exposed had a higher risk to develop the "oxidant stress" and inflammation processes. Finally, we also established that the resistance of healthy military personnel to stress is determined genetically and is associated with A2, A9, A10, B8 and B14 HLA-antigens. Other factors are A3 and the B7-antigens association.

In summary, the immuno-genetic approach to the prognosis of changes in the health status of military specialists has enabled us (a) to develop new methodological and organizational medical principles for the dispensary system and for the rehabilitation of military personnel working under extreme conditions, (b) to set new criteria for a scientific evaluation of working conditions, (c) to unify the medical screening of military personnel which has repeatedly been exposed to adverse and harmful occupational and environmental conditions, and (d) to obtain information on which medical-prophylactic and preventive rehabilitation measures can be based.

"The Role of the Branch Unified Standards of Medical Technologies in Ukrainian Public Health System"

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The history of development of medical standards in Ukraine started from the late of 1980s when on the wave of economic innovations, a number of local medical facilities standards have been produced. Their practical use, however, led to obtain not only positive but also negative experience such as a lack of uniform criteria, scientific and methodological substitutions of standards creation did not allow to carry out of the comparative evaluation of medical facilities activity and to undertake analysis of medical and economic effectiveness of standards use. The technological standards had various levels to guarantee the medical care quality providing by comparable medical facilities.

The modern world practice accepts the use of institutional (medical facilities) standards under one condition: they should correspond to the state standards. Where possible the local standards may comprise extra medical services, more comfortable accommodation for patients, etc., but their level should never be lower of the state medical standards. The creation of unified standards of medical technologies relating to inpatient care is a staged process.

I stage - development of unified scientific methodological approaches to create the standards of medical technologies;

II stage - realization of formalized performance of curative-diagnostic process for treatment facilities of II, III and IV levels;

III stage – development of the draft of unified standards of medical technologies and preparation for their approval on the State level;

IV stage - submission of the project "Temporary unified branch standards of medical technologies" to the Ministry of Health (MOH).

This work was conducted by leading researchers and specialists of the Ukraine MOH and the Academy of Medical Sciences. The scientific, methodological and publishing support was provided by the Ukrainian Institute of Public Health (UIPH). The methodological base to create standards of medical technologies and treatment quality was as follows:

1. The use of modern medical technologies, methods, schemes of diagnostic and treatment, consultations to achieve the best quality and effectiveness of patient's care and treatment.

2. Unity and adequacy of diagnostic and treatment processes.

3. The use of medical technologies based on the latest scientific advances.

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4. Implementation and management of diagnostic and treatment procedures as the single technological process.

5. The evaluation of medical services quality based on reliable criteria.

6. The use of medical statistics comparable with the countries – members of WHO.

7. Providing standards with uniformed structural and functional grounds.

We developed the standards of medical technologies for medical facilities providing specialized and highly specialized medical care. This work was carried out within medical services (profiles) based on the approved list of physician specialties, and stages of medical care: level two-district, level three-regional, level four-the State clinical facilities. The medical standards for 30 medical specialties of adult care and 26 – for children care have been developed. The structure of the treatment-diagnostics standards is following:

1. Notification of nosological forms and their groups accordingly to the International Classification of Diseases of the 10-th revision (ICD - 10);

2. The list and the number of diagnostic examinations according to the level of medical care proving by the particular type of medical facility;

3. The list of treatment procedures for each type of medical facility;

4. Requirements for the treatment outcome;

5 Average time of patient stay in hospital.

Various components of medical technologies have been presented in the standards: laboratory, functional, X-ray and other methods of diagnostics, medicinal and nonmedicinal treatment as well as rehabilitation methods in accordance with existing traditional medical practice and instructive materials. Medication therapy is presented in names of drugs and medicines groups and in some cases a remedy of choice has been nominated by its principal active components. Such a conceptual approach will solve the problem of interim substitution of pharmaceutical means belonging to the same group and promote to prescribing of domestic medicines.

This aspect is important in modern conditions of drugs and other medical disposable materials supply of Ukraine medical facilities because prices of domestic therapeutic means are much lower than of imported analogies. Substantiation of this approach is determined also by the regulatory functions of the standards for medical technologies.

Unified standards of hospital medical technologies are components of an integral technological process of medical care provision. As the separate technological elements of medical care are laboratory, functional, X-ray and other methods of diagnostics; some treatment and rehabilitation methods carried out in accordance with the medical traditional practice and existing departmental instructive materials for providing such kind of medical care.

Introduction of the branch medical standards is directed to providing patients with minimum granted type and quality of medical care and its supervision on internal (self-control) departmental (Ministry of health) and external (Public organizations, Insurance Companies, etc.) levels. After introduction of

mandatory health insurance system the medical standards obtain the status of legal documents for insurance Companies, serving as the financial documents. They can also be used in medical facilities accreditation procedure, which is regulated by the resolution of Ukrainian Council of Ministers and corresponding orders of Ukrainian Ministry of Health. The branch standards are intended to protect the rights of both medical workers and patients, and to serve as a guarantee for observing the principles of equality in providing of medical care.

Taking into account rapid development of the new medical technologies and methods of treatment the medical standards should be considered as the subject for annually revision. Procedure for introducing and regular reviewing of the branch standards has authorized by the special order of Ukrainian Ministry of Health.

Some unified branch standards of medical technologies are used for preparing of the *List* of domestic and foreign medicines being permitted to acquire from the budget sources. Such a list will promote more rational utilization of very limited medical resources. A number of other normative documents relating to supply of population and medical facilities with pharmaceuticals are now in the stage of development.

Thus, the whole package of newly introduced unified standards of medical technologies is seen as an instrument to control the quality of medical care. It is the legal document, defending patients' rights and regulating wide spectrum of medical activities. It promotes introduction into medical practice new, more effective technologies and therapeutic means to obtain better results of treatment and to make performance of medical facilities more efficient.

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Medical Evacuation, History and Development— The Future in the Multinational Environment

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SUMMARY:

This paper will present a brief overview of the history of casualty evacuation from the battlefield. The development of this essential part of military medical services will be reviewed, with particular emphasis upon the development of air evacuation. The future of casualty evacuation in the multinational environment of the new strategic situation will be discussed, along with NATO efforts to standardise various aspects of this modality of patient care.

DISCUSSION:

Since the dawn of warfare, clearing the wounded from the battlefield has been a persistent problem, and it remains so today.

In the earliest wars, there was no organised system for evacuating wounded from battlefields. In many wars, the slightly wounded were enslaved, and the seriously wounded were killed or left to die on the field. The only way a casualty got off the battlefield was under his own power, or with the aid of a comrade. Even the ancient Greeks and Romans, who had military surgeons and occasionally field hospitals attached to their forces, failed to provide any viable means of evacuation.

Historically, the advent of the first truly organised military medical systems which included evacuation capabilities was found in the army of the Byzantine Empire. *Scribones*, stationed a hundred meters behind the action, served as corpsmen with the mission of rescuing the wounded during battles. They were paid for each casualty they rescued. No similar formal evacuation system existed in Western Europe until the late 18th century.

Prior to the Napoleonic wars of the late18th century, there was limited interest in evacuation for many reasons. The primary reason was that generally, any casualty who needed care beyond that of what today we would consider first aid was probably not ever going to return to duty—medical care of the period simply was not able to offer much hope for treatment or cure. "Natural triage" decided which casualties would receive care and which would not. Wounded soldiers who did live were simply a hindrance to future operations of the Army, and in some states were costly, due to war pensions or payments required, which often were not paid to the relatives of those killed in combat. Further, evacuation of the wounded required that other combatants be removed from the fight to provide their transport, or tied up transport needed for other military functions. To an extent, the ability to move patients from the battlefield developed much more slowly than did other medical capabilities in the 18th century armies--- evacuation was not generally believed to be a medical responsibility, and in general the surgeons cared only for those who could be brought to their facilities by others, or who could get there on their own.

As medical capabilities increased, as in Napoleon's medical services under the leadership of his surgeon Baron Dominique-Jean Larrey, a growing interest developed in decreasing the time between wounding

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and surgery. When he took his position as Surgeon-Major of the Army of the Rhine, Larrey noted that the "wounded were left on the field, until after the engagement, and were then collected at a convenient spot, to which the {field hospitals} repaired as speedily as possible." He soon realised that "most of the wounded died from want of assistance". This recognition led to his development of the "Flying Ambulance", which as originally designed was a light wagon used to take surgeons forward to the casualties, rather than the reverse. However, in his later years, Larrey developed these "ambulances volantes" into patient-carrying vehicles, which actually had provisions for enroute care, and thus engendered the beginning of true patient evacuation systems. By the time of the Italian campaign, Larrey had organised and equipped three divisions of ambulance services, complete with evacuation vehicles, trained personnel, and equipment. He further developed his ambulance service in the Egyptian, Syrian, and Polish campaigns, with great success. Unfortunately, most other armies did not learn adequately from Larrey—while they began to develop evacuation systems, in most cases they were inadequately staffed and equipped to be usable. Such personnel as were made available for casualty movement were generally detailed from the line rather than belonging to the medical services, and adequate appropriate vehicles for this mission were rare.

By the middle 1800s, most Armies had developed some sort of evacuation system. They often proved totally inadequate to the task, as they did at Waterloo, Gettysburg, and the Crimea, but at least they were beginning to be seen as important and as a medical responsibility. They were, as today, often characterised by "ad hoc" improvisation, and rarely used any vehicles which belonged to the medical service. Even the limited numbers of "medical" vehicles were normally little different from those used by non-medical units. The failures of the American Civil War and the Crimean War, coupled with the increasing "humanitarianism" of the age, led to a demand for better medical care for the wounded, as organised by Jonathan Letterman, Clara Barton, Florence Nightingale, Henri Dunant, and Nikolai Pirogov.

As organised evacuation became more common in the late 19th century, and as military medicine improved its capabilities, commanders began to see that there were distinct advantages to organised systems of evacuation. No longer did evacuation of a casualty necessarily demand that other combat troops leave the combat zone to move him; morale improved among to troops, since they believed they would receive improved care if wounded; and the survival rate among wounded soldiers improved dramatically.

Every draft animal ever used by an Army has been pressed into evacuation service, as has nearly every type of vehicle. As each new vehicle has become generally available, it has been adapted to medical use. Horsedrawn wagons were gradually replaced by trains and motor vehicles, which have since been supplemented by aircraft. Until after WWI, however, one thing was sorely lacking--- routine medical care en route. Gradually, throughout WWII and until our era, care en route has improved, patient survival has increased, and the logistics burden on the forward commander has been reduced through his improved ability to move casualties rearward rather than medical support forward.

Most of the mechanisms of patient evacuation, particularly those which are man- or animal-powered, have evolved very little since the dawn of time. Most casualties in "big" wars, or in conflicts in the third world, still receive transportation support which is indistinguishable from that of centuries past. Man-carried and animal-powered evacuation continue to be used in various parts of the world, and will probably always play a major role in the combat zone—unfortunately, generally speaking these will always provide simply transport, with little care enroute being possible.

During and since the Second World War, there has been increased emphasis on using evacuation to actually benefit the patient during transport, rather than seeing it simply as another form of "cargo hauling". This requires specialised equipment and trained transport personnel. We see this development today primarily in some well-equipped ground vehicles and in some aircraft. In a large war, it is unlikely that any nation can afford to provide each casualty with modern intensive-care level care during transportation, and in such circumstances we will probably fall back on less-capable transport means. However, in peace-keeping or crisis response operations, in which fewer casualties are expected, our nations may demand that each and every patient receives the highest possible level of care. This demand

is now NATO policy, in that MC 326/1 demands that “even in crisis or conflict, the aim is to provide a standard of medical care as close as possible to prevailing peacetime medical standards." This demand on the part of our nations will mandate ever-increasing reliance upon state-of-the-art evacuation capabilities for the foreseeable future. No longer will the empty truck or the empty helicopter, without medical care of the highest level on board, be considered as providing an acceptable level of care.

One of the most-used forms of patient transportation today is aircraft. The development of this form of evacuation from a dream to a reality reflects in a microcosm the development of patient evacuation in general. For the next little while, I would like to review with you the history and development of air evacuation, and point out some of the lessons learned in the past, its capabilities for the future, and its role in the new multinational medical support concepts of NATO.

The history and development of the capability to provide in-flight medical care closely parallel both the history of flight itself and that of medical technology. From the earliest days of flight, Physicians have been trying to use aircraft in the care of their patients, and it may be useful to review the development of this modality.

The history of aeromedical operations can be generally divided into four eras:

- Period up to 1920—Theory and “heroic experiments” (conception and pregnancy)
- 1920-1939—intermittent interest and development of systems (infancy)
- 1940-1960—growth and development of systems—patient as “cargo” (adolescence)
- 1961-present—full acceptance, rapid growth, increased technology—patient as “patient” (Adulthood)

Conception and Pregnancy--

Although aeromedical evacuation has been most recently brought to public attention as a result of its massive use during the War in Viet-Nam and the preparations for its massive use during Desert Storm, it is not a new concept. In fact, the concept of aeromedical transportation pre-dates even the first heavier-than-air powered flight by the Wright brothers in 1903. As early as March 1784, following the balloon flight demonstrations of the Montgolfier brothers before the medical faculty of Montpelier, physicians began to consider the benefits their patients could gain from flight. They early theorised that, not only could sick patients tolerate flight, but that they would in fact benefit from “the purer air encountered at altitude”. So far as I can determine, no practical use was ever made of the concept of balloon evacuation. It has been reported many times that in 1870, during the Prussian siege of Paris, over 160 sick and wounded patients were evacuated by means of balloons. Having investigated this situation in great detail, I can inform you with assurance that no such patient evacuations ever took place during the siege of Paris.

Between 1892 and 1910, the innovative Surgeon General of the Dutch Army, General De Mooy, developed an entire concept for medical evacuation, including ground vehicles, aircraft, dirigibles, and captive balloons pulled by horses. Unfortunately, this forward-looking concept, which gained him the sobriquet of “the Jules Verne of aviation medicine”, was never tested nor implemented.

The first great step forward in the concept of aeromedical evacuation occurred in 1909, when Captain George Gossman, a U.S. Army medical officer, joined with Lieutenant Albert Rhodes of the Coast Artillery Corps in designing and building an aircraft specifically for the transportation of patients. The aircraft, though crude and requiring the patient to lie unprotected on the wing alongside the pilot, was successfully flown (once!); and Gossmann and Rhodes attempted to convince the War Department to develop the concept further. Since this proposal was made only a year after the Army purchased its first motor-driven ground ambulance, and in the same year in which the Army purchased its first aircraft (it was not to purchase another for two years), it may be imagined with what degree of success they met. In the face of War Department obstinance, numerous medical officers took up the battle for air evacuation. The response of the War Department echoed that of the newspaper, the Baltimore Sun, which proclaimed that “the hazard of being severely wounded was sufficient without the additional hazard of transportation by airplane.”

In France, too, military medical professionals faced opposition from the Ministry of War in attempting to develop an air evacuation capability, but the opposition of the conservatives was to be overridden by the force of circumstances. In November of 1915, during the retreat of the Serbian Army from Albania, it became impossible to evacuate all the sick and wounded of the French Expeditionary Force by ground means, and it was unthinkable to abandon the wounded to capture. Therefore, although the only available aircraft were fighter aircraft in poor condition, the decision was made to attempt evacuation by air. The first heavier-than-air evacuation in history took place on 15 November 1915, and over the succeeding month, 13 wounded were evacuated from front-line, poorly-prepared airstrips, often within rifle shot of the enemy. Based on this dramatic evidence of the usefulness of air evacuation, as well as on the results of exercise trials, the French Government authorised the development of the first air ambulances, which were first used in combat on the Aisne front in 1917. However, the risk of aircraft losses derailed this experiment, with one member of the Chamber of Deputies crying "Are there not enough dead in France today without killing our wounded in airplanes?"

The United States, in gearing up for entry into WWI, developed numerous new flying fields. These fields were established in areas of the country with poor roads, and it was often a matter of several hours before a student pilot injured in a crash could be brought to a hospital. Flight Surgeons rapidly began to develop air ambulance conversions of the JN-4 "Jenny" training aircraft, and by 1919 such ambulances were a fixture on all training fields.

By the end of WWI, air ambulances were in common use in the United States, and had seen limited combat use in France. No other nation actually used air evacuation, though the United Kingdom had experimented with it before the war. However, neither medical systems nor the airframes themselves were able to allow in-flight medical care. Though built in numerous versions, each of these early air ambulances had one common feature—the patient was enclosed in the fuselage, without an attendant, and with no possibility for care in flight. In this regard, they were the model for most air ambulances during this period. Even though the air ambulance was a reality, it was seen only as a means of transportation, rather than as an integrated part of the medical care system.

Infancy--

Although air ambulances were certainly in increasing use following WWI, there did not appear to be any great need for systematic air evacuation on a large scale during peacetime. Most nations paid little attention to the issue, though military air evacuation systems were developed by France and Britain for use in their colonial wars, and successfully evacuated thousands of casualties. For the first time, there was an effort to provide some limited in-flight care, and one Breguet XIV-b Limousine was described as having "electric boilers, coverlets, tank of oxygen, surgical instruments, and dressings". For the first time, aircraft were integrated into the military medical system, even though still under command of non-medical officers. The benefits were clearly recognised, but unfortunately the systemic changes needed in military medical establishments to make optimum use of this new modality were not adopted by most nations.

Beginning in 1920, the U.S. Army developed an ambulance modification of the Dehavilland DH-4, which was produced in significant numbers, and several of which were used extensively on the Mexican border. Just as had been the case with earlier air ambulances, these planes carried their patients isolated in coffin-like enclosures built into the fuselage. As these planes became obsolete, the Army began to experiment with various types of air ambulances, most of which were produced in only one copy for experimental purposes. Some of these, notably the Curtis Eagle, provided adequate space inside so that a physician could accompany the patient and could (at least theoretically) provide some care in flight. In 1930, the Ford Trimotor of the U.S. army was described as the "largest and most complete airplane ambulance ever designed". It carried a physician and medical technician, who had access to various instruments, drugs, splints, and dressings. However, during the money-tight 1930s, the United States was unable to really create an air ambulance service, and official interest in the concept was nearly non-existent.

This interest on the part of medical professionals was not restricted only to the United States, France, and the United Kingdom. During the 1930s, most aircraft manufacturers in Europe produced at least one

ambulance version, and soon there appeared ambulance versions of amphibians, flying boats, “touring airplanes”, and float planes, in addition to the normal military aircraft of the day. Both military and civilian versions were produced, with significant civilian use being made of them in countries with large, sparsely-populated, regions such as Sweden, Thailand, and Russia. The most comprehensive civil system was probably that of Russia, while France and Germany developed probably the world’s most extensive military systems prior to WWII, with France even fielding squadrons of small aircraft with built-in patient oxygen (though they still could provide no in-flight care capability). The Germans developed an extensive system of evacuation during the Spanish Civil War, by which casualties from the German Condor Legion were evacuated over the Alps, covering distances of up to 1600 miles at altitudes of up to 18,000 feet in unpressurised JU-52 aircraft. Only minimal care beyond oxygen and dressing changes was available in-flight.

Adolescence--

During WWII, necessity dictated the development of a world-wide air evacuation policy for both sides. The Germans had an extensive military evacuation system established at the time of the onset of war with Poland, and by August of 1941 they had evacuated over 280,000 casualties. The Russians used air ambulances extensively during the Winter War with Finland, though again only minimal care enroute was possible—their larger aircraft carried only Oxygen as a treatment modality, along with hot water bottles and blankets. Some of their evacuations were even more basic, reverting to the concepts of patients as cargo—they actually carried patients in enclosed pods mounted on, or hanging under, the wings of their PO-2 and U-2 aircraft. However, the massive distances involved in this war rapidly led to a heavy reliance on air evacuation in all theatres. From the time of the early Japanese successes in Southeast Asia to the end of the war, over 1.2 million patients were evacuated by U.S. Aircraft alone, utilising standard cargo aircraft, usually without medical support. Patients were no longer restricted by injury type, and in fact all types of casualties were moved. Care in flight began to be developed, and by the middle of the war included injections, transfusions, pleural fluid or air aspirations, and tracheal care. Long range aeromedical evacuation had become a reality.

Ad hoc innovation was common. One prime example of the innovations developed in the realm of air evacuation took place in June 1944 when an officer in Western China developed Respiratory Polio. He survived 14 days of artificial ventilation, while an airstrip was built. A homemade respirator was designed, and he was flown out in a small aircraft, with the patient himself pumping the chest compression pump as he rode. Subsequently, he was flown “over the hump” to India in a C-47 with an iron lung.

Although the major form of air evacuation during WWII was long range, what we now call theatre or strategic, it must be realised that another form of air evacuation was also in use. While there were continuing efforts to improve the amount and quality of care which could be given in flight during the long-range flights, there was a realisation that other flights from the forward areas to medical facilities to the rear were still needed, even if care in flight was not available. Accordingly, small aircraft were routinely used on a regular basis by all the belligerents, and helicopters began their career as lifesavers, though on a very limited basis.

First used to evacuate casualties from isolated patrols in Burma, the helicopters soon developed a reputation as lifesavers, and new models were rapidly developed. Used by the French in Indochina after WWII, by the British in Malaysia, and by the UN forces in Korea, helicopters rapidly took over the role of short-range evacuation from the small fixed wing aircraft. Although only very limited care was available in flight (IVs including plasma, inserted prior to flight), the helicopter became a mainstay of military medical services.

Continued development was the norm after the Korean War. For example, in 1954, the U.S. C-131 was produced in series, the first specifically-designed fixed wing air ambulance with modern technology. It was not only pressurised, but air conditioned, and was designed to routinely carry major medical life support equipment such as iron lungs.

Looking back, we are forced to observe that the record of air evacuation in WWII and the Korean War, though a proud one, is not the product of such imagination, development, and forward planning as one expects of the air age. The most persistent experimenter was "necessity", faithfully providing again and again situations in which air was the only or the best means of evacuation.

Adulthood--

The shortcomings of the early helicopters were recognised as a result of their use in Indochina, Malaysia, and Korea, and soon after the Korean War a design competition was held to choose a new U.S. Army helicopter ambulance. The winner of the competition, the Bell XH-40, later to be called the HU1 "Huey", was built to medical department specifications, and became the most successful helicopter ambulance to date. With the development of the Huey, along with organisational and operational changes made between the wars, the U.S. Army was well-prepared to carry out forward air evacuation missions during the War in Viet-Nam. For the first time in the history of warfare, there was an extremely good chance that a soldier wounded in battle could be receiving specialised medical care within one to two hours of being wounded. Specially trained medical corpsmen were used on these aircraft, and contributed greatly to the success of the mission, starting IVs, stopping bleeding, maintaining airways, and occasionally even doing life-saving surgery such as cricothyroidotomies. As a result, of those evacuated who lived to reach a medical facility, about 98% survived, hospital stays were reduced, and the overall risk of dying in combat if wounded was reduced to less than ½ of the risk during WWII. At the same time that the Army was carrying out its forward mission of air evacuation, the U.S. Air Force re-activated its massive inter-theatre airlift of WWII and Korea, moving hundreds of thousands of troops out of Southeast Asia to Japan, the Philippines, and to the United States. Of great importance was the inclusion on the crews of flight nurses and medical technicians who were able to carry out increased levels of medical care and monitoring in flight.

Throughout this period, we have seen continuous improvement in the medical capabilities found on air ambulances. In the 1960s, aircraft routinely carried stryker frames and respirators. Emerson pleural drainage pumps and closed water seal drainage became the norm. Intermittent positive pressure breathing devices were flown routinely, as were the then-new Baby Bird Respirators. In the 1970s, air ambulances began to routinely carry neonatal transport units, physiologic monitoring equipment, defibrillators, and IV pumps. By 1973, Belgium had Aerospatiale Pumas with sophisticated medical equipment for intubation, suction, drainage, probing, cardiac infarction monitoring, defibrillation, etc. In the 1980s, it became nearly routine to fly with Intraaortic balloon pumps and doppler blood pressure measuring devices. Portable hyperbaric chambers have been routinely flown since the late 1980s. This rapid infusion of medical technology into the air environment does not show any sign of slowing down. There is now only a lag time of 4-5 years between introduction of a piece of equipment into the hospitals before it appears in the air, and that appears to be decreasing. Today, almost any piece of equipment short of an MRI has been put into an aircraft, and we have finally reached the capability of the true flying Intensive Care Unit.

All in all, it is in this period during which air evacuation has really come of age. We are now truly able to say "Patients are not cargo; patients are not passengers; patients are patients."

CONCLUSION:

Operations during Desert Storm demonstrated that the old concept of having large medical facilities forward which could provide definitive surgery on all patients and hold them until they were "stable" was no longer viable. It became evident that the movement of more "stabilised" or "unstable" patients would become the norm, and most of the major nations have now implemented systems to ensure the provision of more highly-trained medical aircrews and more "intensive care unit"-like equipment in both fixed and rotary wing ambulances. Of interest is the fact that the civilians seem to be leading this move. With a few outliers, such as the ability to move highly infectious patients in P4 containment, the civilians are leading the way in acute care in the airborne environment. Many of our university hospitals have developed air

ambulances with capabilities far in advance of those of our military services, and we in the military are only now starting to catch up.

The transformation of the security environment in Europe has had a profound effect on the North Atlantic Alliance. Major reductions in the levels of armed forces, combined with the acceptance of new or expanding tasks (such as IFOR, SFOR, and KFOR) have presented significant new challenges to NATO's medical staffs. On the one hand, "peacetime level" quality of care is demanded, while on the other hand, there is a demand for decreased deployments of increasingly scarce medical resources. Thus, the concept of putting large medical establishments on the ground in the forward area is rapidly losing favor, in light of improved evacuation systems. In the near future, we envision that the majority of evacuation will be by means of multinational aeromedical evacuation, a concept for which is included in AJP 4.10, which is currently out for national ratification.

Present evacuation trends indicate that both air and ground ambulances will serve in the battle areas of the future, but the increased depth, width, and complexity of the operational areas indicates a recurring need for both lateral and rearward movement. It therefore becomes obvious that, so long as air supremacy can be maintained, the bulk of the workload will be via airlift, rather than via ground means, especially in Crisis Response or Peacekeeping Operations.

Improved medical care capabilities being placed in the American UH-60Q model Blackhawk helicopter, the critical care transport teams of several nations, and such new items of equipment as the portable intensive care unit called LSTAT (Life Support For Trauma and Transport) unit are only now being fielded. Some nations have developed intensive care "boxes" which can be placed in certain types of commercial aircraft, but unfortunately these are available in very limited quantities, and can provide care for relatively few patients. Unfortunately, development in this field is very uneven, with some nations being far ahead of others, some of which are still in the WWII era as far as quality of in-flight care is concerned. We at NATO are devoting much effort to development of standardisation documents which will enhance interoperability of national air ambulance systems, and which will eventually lead to truly multinational capabilities in this arena. To date, we have such agreements covering litter specifications, on-board medical equipment, medical crew training and staffing, and administrative requirements. Others are currently in development.

For the farther future, who knows what evacuation means will be used? I suspect we will see, in not too many years, the first use of a space shuttle to evacuate a casualty from the international space station. It is doubtful that such an evacuation could rightfully be termed "air evacuation", but it certainly would be a direct descendent of the concepts and capabilities in evacuation developed over the past several hundred years. I for one am looking forward to seeing that.

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Qualified Aeromedical Evacuation in the Extended Task Spectrum of National and International Military Missions

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HISTORY

The history of aeromedical evacuation (AE) is short and closely associated with the beginning of manned aviation. Its origins are credited to the Dutch medical officer De Mooy who, in about 1910, was the first to conceptualize the air transport of wounded patients and to describe the interaction of road, rail and air transport. Air transport of wounded patients in hot-air balloons, frequently mentioned in the context of the Franco-Prussian War, however, must be considered a military anecdote as there is no historical evidence for it.

First documented evidence for the routine employment of aircraft for the transport of wounded patients exists for the First World War when France established an aircraft ambulance organization. During the Spanish Civil War (1936 – 1938), the air transport of wounded patients to Germany was conducted on a larger scale. JU-52 type aircraft were equipped with 10 stretchers. In addition, there were seats for up to 8 soldiers. Medical oxygen was available and administered during the crossing of the Alps.
By time of the Second Word War, organized air transport of wounded patients had been established in the military. The US-Army Air Corps for instance had evacuated 1.25 million patients by aircraft and with limited in-flight care (flight nurses) by 1945. While approximately 4% of the wounded were dead by the time they arrived for the first emergency surgical treatment during the Second World War, this percentage could be reduced to 1% during the Vietnam War when the introduction of helicopters for air rescue missions was brought to bear on a large scale.
The operational need for a qualified AE system can also be inferred from the example of operation Desert Storm where approximately 30,000 allied soldiers were evacuated from the operational theater for reasons of health. During the KFOR/SFOR mission, the German Air Force evacuated 3o2 soldiers in 1999 by air, of which 25 patients were under critical conditions. During the UN Interfet mission in East Timor (21. 10. 1999 – 23. 02. 2000) in 47 missions 230 soldiers and civilians were evacuated from East Timor to Darwin / Australia, of which 25 patients needed intensive care.

OPERATIONAL REQUIREMENTS

NATO strategy changed with the end of the Cold War. The integration of crisis reaction forces in the new military strategy of NATO, that is determined by the basic characteristics: ***concentration of forces, flexibility, global mobility, multinationality and rapid augmentation*** requires an efficient medical service. In addition to the conduct of national sovereign tasks, it must have the capability for international cooperation in the sense of interoperability (standardization).
This determines the employment options of the medical service within the scope of national and collective defense and peace support operations.
In this context, the military requirement is that the mobility and flexibility of medical support during operations must correspond to the mobility and flexibility of the units to be supported. Thus the transport of wounded and sick patients receives a new status as far as quality and quantity are concerned.
The responsiveness of the medical service and especially of an efficient AE system must be adjusted to the responsiveness of the international UN crisis reaction forces, of NATO reaction forces and to that of the forces employed for rescue and evacuation operations and must be available for ad-hoc operations within the

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scope of disaster and emergency relief if required. An efficient air transport system for wounded patients is definitely required operationally for sustained operations to establish sustainability and to cope with periods of peak requirements.

Fig. 1: Transall C 160 (Dietmar Plath)

In addition, the Surgeon General of the Bundeswehr in his technical guideline dated September 27th 1995 set forth the following maxim for the medical support of Bundeswehr servicemen abroad (quote):
”The maxim of task accomplishment in the medical service is that the soldiers in the event of an illness, accident or injury shall receive medical care, that, as far as the result is concerned, corresponds to the medical standard in Germany.”

This must certainly also apply to the medical evacuation chain.
The implementation orders for German aeromedical evacuations are set forth in the ”Fachdienstliche Anweisungen des Inspekteurs des Sanitätsdienstes der Bundeswehr” (Technical Directives of the Surgeon General, Bundeswehr) B 45.01. At NATO level, AE is established in STANAG 3204 and a conceptual NATO document on ”Aeromedical Evacuation” is expected to be promulgated soon (AJP – 4.10; Allied Joint Medical Support Doctrine). This impressively underlines the status of qualified aeromedical evacuation within NATO.

Aeromedical Evacuation(AE) is the movement of patients under medical supervision by air transportation. It may include up to three phases that are complementary:

Forward AE. That phase of evacuation which provides airlift for patients from the battlefield to the initial point of treatment and to subsequent points of treatment within the combat zone.(National responsibility)

Tactical AE. That phase of evacuation which provides airlift for patients from the combat zone to points in the Communications Zone (COMMZ), and between points within the COMMZ.

Strategic AE. That phase of evacuation which provides airlift for patients from overseas areas or from theatre of active operations, to home nation, to other NATO countries.

In addition to the AE requirements based on operational reasons – the German Army for example reported a daily transport requirement of 480 patients for long range (strategic) air transport - the extent of AE is increased by the ”Evacuation Policy” determined by the military command. This policy establishes the maximum period of a soldier’s unfitness for service in the operational theater. If, according to medical prognosis, this period will be exceeded, the soldier is to be evacuated as soon as this is possible and can be justified from a medical point of view.

GENERAL/AEROMEDICAL ASPECTS

Aeromedical evacuation is usually the fastest and in many cases the only live saving mode of transportation. It is conducted in the knowledge that the immediate clinical care for acute conditions will decisively improve the patient's prognosis on mortality, invalidity and the development of posttraumatic stress conditions. In view of this, the modular medical facilities in the operational theater are indispensable assets of the qualitative and scalable medical support that must be complemented at all levels by aircraft that are properly equipped and assigned to air transportation forces.

Upon conduct of appropriately thorough preparations there should be no absolute contra-indication against an AE, given sufficient personnel and material. Qualified aeromedical evacuation of wounded and sick patients can only be conducted as efficiently as possible if the medico-technical requirements are met and the accompanying medical personnel is appropriately trained. Basic knowledge of aeronautics, aviation medicine and flight physiology must be demonstrated in addition to the clinico-technical expertise in emergency and intensive medicine.

The accompanying medical personnel should belong to the aircrew and be subject to the appropriate airworthiness criteria. The immense logistic and financial effort required can only be justified if the in-flight medical care meets the standard of the personal medical care provided at home.

In this context, however, the physiological factors that influence air transportation are of particular aeromedical importance *(Fig. 2)*.

MEDICAL SERVICE SPECIAL ISSUES

During operations, the totality of military services is provided at three functionally coordinated levels *(Fig. 3)*.

Level A (NATO: role 1-2) comprises pre-clinical emergency medical care as well as, depending on the situation, emergency special surgical and internist measures (emergency station, rescue center). At this level the medical service is tasked with the maintenance of the physical vital functions and the establishment of the fitness for travel. This also involves efficient ground and air based means of transportation for medical evacuation.

Level B(NATO: role 2+ to 3+) includes the multidisciplinary clinical and ambulant treatment of acute conditions in all relevant medical disciplines (deployable hospitals, Host Nation Support).
The controlled and medically monitored aeromedical evacuation will be conducted at this level.

Level C (role 4) comprises further clinical care and rehabilitation outside the operational theater (preferably in the home country).
This is the domain of relieving aeromedical evacuation by means of which patients submitted to medical (intensive medical) monitoring are transported to receiving medical facilities outside the operational theater in the event of deployments or when local capacities are exceeded.

OPERATIONAL NEED FOR MEDICAL MONITORING

Especially in the tactical and strategic area, the operational concept described above results in an extended operational spectrum for AE, which impressively demonstrates the necessity of in-flight intensive medical monitoring.

- Within the scope of the preparation of operations and during the buildup of medical facilities in the operational theater, an efficient AE system for the qualified medical support of the soldiers deployed is to be established before the modular medical facilities are put into operation.
- Bundeswehr missions to be conducted without a sufficient preparation period for the medical service require a highly responsive medical support system that also meets emergency/intensive medical requirements. Well trained specialist personnel and medical equipment are transported to the operational theater immediately and ensure a qualified evacuation of patients.
- When the crisis reaction forces of all services are employed to full operational strength (50.000 soldiers), the number of wounded and sick patients incurred is expected to exceed the overall capacity of the currently planned four deployable hospitals of the Bundeswehr Joint Medical Service and the German Army

Medical Service (Level B) even before the end of the second day of combat after the outbreak of hostilities (worst case scenario) if insufficient AE capacity cannot ensure the required relieving air transportation including transports involving intensive medical monitoring. The medical support during crisis reaction operations must be prepared, as far as plans and organization are concerned, for a massive number of wounded and sick patients.

- Analogous considerations for international crisis reaction operations in different operational theaters produced similar results.
- A sufficient AE capacity providing intensive medical monitoring and the additional option of intensive medical treatment is a prerequisite for the provision of aid within the scope of humanitarian missions and also of other non-article 5 missions (civil-military cooperation) during a large scale damage event where the medical infrastructure is insufficient.
- In view of the maxim of medical support during operations abroad, various traumata/posttraumatic conditions require a fast aeroevacutaion from level B to a medical facility at level C for definite treatment and for the relief of the modular medical facilities (maintenance of personal medical care). These include
  - **Severely burnt patients**, who can be evacuated to special clinics with comparatively little effort during the first 24 hours after incurring the burn and subsequent to first clinical treatment to ensure the provision of an adequate therapy (transplantation surgery, dialysis, intensive medical care).
  - **Polytraumatised patients** with or without burns and an imminent posttraumatic, dialysis-requiring renal failure with the consecutive failure of several organs must be evacuated to medical facilities capable of providing dialysis, after emergency surgical treatment.
  - **Neurologically traumatised patients,** who, after the necessary neurosurgical treatment, must be evacuated to an appropriate level C medical facility for further care and rehabilitation (apallic syndrome, tetraplegia).
  - **Toxicological diseases** of patients exposed to chemical warfare agents indicate long term respiration, especially in the event of inhalation traumata, which requires the evacuation from the operational theater to relieve local medical capacities.

In order to meet these requirements, a patient transport unit (*fig. 4*) for AE was developed and is currently in service.

Fig. 4: Patient transport unit

If required, the patient transport units, that are suitable for transports involving intensive medical monitoring, can be employed as a backup system in a modular way to expand the intensive medical capacities at level B. This requires a sufficient maintenance float of patient transport units.

IMPLEMENTATION

At **level A** aeromedical evacuation as well as air rescue is the responsibility of the individual services.
The primary and secondary qualified **air transport by helicopter (forward area)** comprises:

- the fast and immediate transport of specialists and medical equipment to the location of employment in cases where no medical infrastructure is available (mountains, woodlands, at sea)
- the direct and comfortable transport of emergency patients to individual medical care facilities – medically monitored whenever possible
- the secondary transport of intensive care patients to specialized medical facilities
- SAR operations in accordance with ICAO and IMO regulations
- CSAR operations in accordance with the respective military requirements.

The military proportion of the overall German air rescue system is considerable. Eighteen Bell UH 1D (German Air Force) and six MK 41 Sea King (German Navy) military helicopters from all parts of Germany are integrated in the system. In 1997, they received 13,585 alerts, conducted 11,343 missions (false alert rate: 2,242 = 17%) and accumulated a total of 5,933 flight hours. 9,921 patients received emergency treatment, 4,673 of whom were transported further by helicopter due to the given indication.
The employment of helicopters for primary therapy has become the standard method in rescue situations involving potentially fatal conditions. **”Train in peace as we plan to function in war”.**

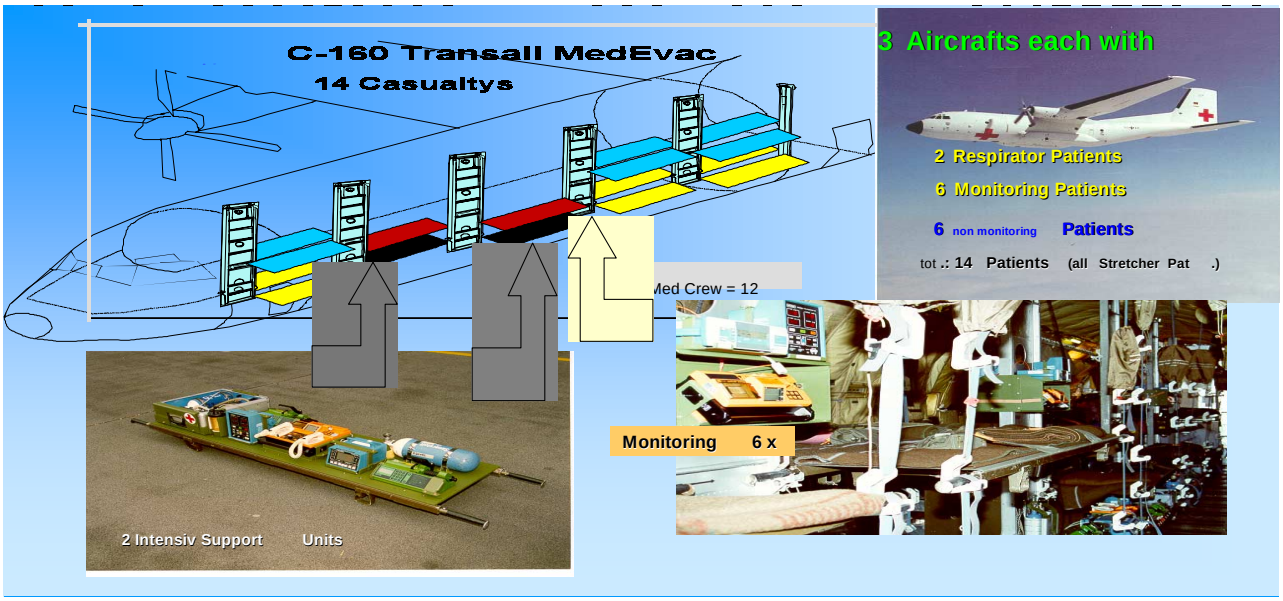
For the area of the German Air Force, the employment of SAR helicopters was defined and specified in the crisis reaction concept of the German Air Force. After the phasing out of the Bell UH 1 D weapon system currently employed, two NH90 LTH/SAR helicopters will be assigned to each GAF rescue center.
CH 53G, Bell UH1D and MK 41 Sea King helicopters are available for the **short-range** air rescue regimen (forward AE) of up to 500 km.

In addition to the transportation of wounded/sick patients, installed conversion kits also allow emergency treatments and the medical monitoring of vital bodily functions. The accompanying medical personnel generally consists of 1 to 4 air rescue specialists trained as rescue assistants.
Physicians with the specialty of rescue medicine, anesthetists or other specialists will be employed in accordance with the given requirements.

C-160 Transall (*Fig. 1*) and CL-601 Challenger aircraft are available for **Tactical** aeromedical evacuation.
The capacity of the **Transall** aircraft generally allows the transport of 62 patients in lying position. However, this conversion kit will only be employed in exceptional cases as it does not allow state-of-the-are medical care and adversely affects flight safety.

In order to provide in-flight medical care, the number of patients to be transported in lying position was reduced to 14. The conversion kit includes 2 intensive care units and 6 monitoring stations providing transport capacities for 2 intensive care patients and up to 12 patients with moderately severe injuries, six of whom can be constantly monitored (*Fig. 5*).

Fig. 5: *Transall C-160, 14-Patient version*



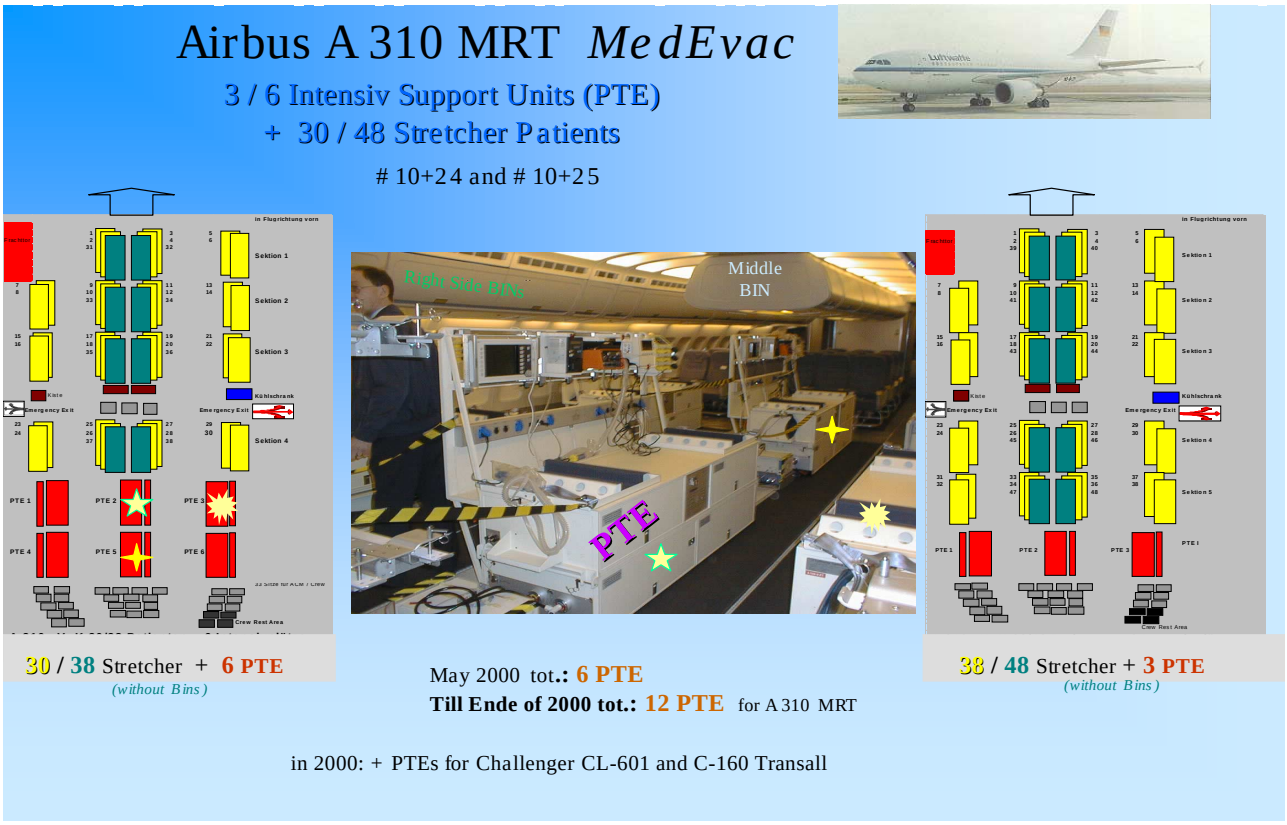
Additional sitting passengers can also be transported.
As a matter of principle, the accompanying medical team consists of 2 physicians with the specialty of emergency medicine, 2 rescue assistants, 4 rescue medics and 4 nurses.

The power supply of the medical equipment such as monitors, electrocardiographs, defibrillators, pulsoxymeters, respirators, perfusors and blood pressure monitors is accomplished via the aircraft power supply system as well as via internal storage batteries and are certified for in-flight operation. In addition, oxygen and drug reserves are also carried on board.
All four C-160 Transall aircraft can currently be configured for the transport of 14 patients. The emergency medical conversion kit can be installed in **Challenger** CL601 type aircraft. It allows in-flight intensive care for one patient. As a matter of principle, the medical crew consists of one physician (emergency physician), one rescue assistant, and one medical attendant. Three emergency medical conversion kits are available for personal aeromedical evacuation.

Strategic Aeromedical Evacuation:

With the conversion of the Airbus A310 to a freight configuration with a large freight door it is now possible to configure this aircraft for large scale strategic aeromedical evacuation missions.
The AE A 310-300 medical conversion kits for the **A 310** aircraft are currently in service to ensure long range transport of a minimum of 250 patients a day.
The conversion kits have a modular configuration. Allowing the implementation of various configurations, a maximum of 38 stretchers, 48 seats and 6 intensive care stations can be installation (*fig. 7*).

Fig. 7*: Airbus A310 conversion kit in different configurations*



The intensive care units (patient transport units, above) have been designed to the most advanced aspects of medical engineering. They are compatible with civil aircraft types and can be employed globally. The conversion kit also includes a laboratory unit. The provision of a telemedical terminal is planned.
A total of 4 sets, containing 54 stretchers, that can be refitted with up to 6 intensive care stations are to be procured. Possible configurations of a set are shown in fig.7.

OUTLOOK

Sufficient and qualified AE capacities at and between all levels of medical care are a prerequisite for the fast, competent and, if indicated, intensively medically monitored transportation of critically sick and/or wounded patients to facilities that provide final specific personal medical care/rehabilitation.
To this end, the structural and procedural prerequisites (command, control, communication, computer, information = c4i) must be given highest priority, to control and coordinate the flow and transfer of patients. The command and control organization, procedures and assets must be such, that they can meet the requirements of all possible AE related employment options for various scenarios, including joint operations, under multinational or national operational command and control.

This requires:

- qualified and trained designated evacuation units
- centralized command, control and communication (c3)
- standardized international procedures
- standardized compatible medical equipment
- all-weather capable aircraft with day /night capability and worldwide communication capability
- appropriate conversion sets for intensive medical monitoring
- civil-military cooperation (NATO CAPC).

The Office of the Air Force Surgeon is currently preparing an operational concept for the aeromedical evacuation in the Bundeswehr that is to meet the qualitative and quantitative requirements of the forces. Based on a careful analysis of ACE Directive 85-5 the German Army reported a daily aeromedical evacuation requirement of 480 wounded and sick patients. The A 310 AE conversion kit is able to meet this requirement at the national level and ensure long range aeromedical evacuations adjusted in type and extent. This is of particular importance in view of the mobility and flexibility of future operations (logistic tail).
In support of these operations, the German Air Force Surgeon established a training course for medical officers at the Air Force Institute of Aviation Medicine (Aeromedical Evacuation of Wounded and Sick Patients, Familiarization for Military Physicians) that is to enable the participants to conduct aeromedical evacuations on their own responsibility. The course prerequisites are clinical knowledge, emergency medical competence and aeromedical experience. Similar regulations apply to the ”Training of medical orderlies for the attendance of sick and wounded patients during aeromedical evacuations” that is also held at the Air Force Institute of Aviation Medicine.

In addition a MEDEVAC medical detachment that is to conduct aeromedical evacuations was incorporated into the establishment of the air transport units. It can be complemented by the flight operations medical detachment. The multilateral contacts aimed at a cooperation in the field of aeromedical evacuations complement these supporting measures.

During multinational operations within the scope of NATO, UN or the WEU the resources available must be used in a responsible and intelligent way. Customary national routines sometimes undermine this objective. The qualified aeromedical evacuation of wounded and sick patients is to be adapted to the requirements of a competently adjusted medical support with specialist expertise, creativity and innovation in its future task spectrum.

SUMMARY

The combination of a coordinated medical care system for wounded personnel at the medical facilities of the three levels A, B and C and qualified forward-, tactical- and strategic aeromedical evacuation forms the basis required to meet the requirements resulting from the flexibility and mobility of the units to be supported. A functional AE system is a decisive factor in the provision of fast and qualitatively adjusted medical support between and within all levels of medical care. This increases the morale of the forces and ensures wide acceptance of the medical service.

The German Air Force Medical Service takes up this task with competence and the employment of all forces and assets considering also the multinational interoperability in that field..
In addition to medicine **for** the third dimension, medicine now also **enters** the third dimension.

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Experience in Organization of Urgent Medical Care in Large-Scale Accident Conditions at Nuclear Power Stations

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The Radiation Medicine Research Center of the Ukrainian
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On the eve of the third millenium the post industrial civilization is turning into a high risk society. A growing number of man caused accidents and natural disasters have made the biospheric influence on man more aggressive. Today we cannot totally exclude emergency situations connected with possible nuclear power accidents on every level of the nuclear fuel cycle, when recycling nuclear ammunition and weaponized plutonium as well as many other cases. Combined with adverse ecological and hygienic effects accidents of this kind may result in negative medical consequences of radiation exposure.

According to a wide-spread opinion, the 20th century has been the most civilized and humane. However, the century is characterized by a growing trend of both man caused and natural emergencies, including radiation. According to the MAGATE information system concerning nuclear reactors 432 reactors operate in 30 countries (approximately 340 Gwt) which is 17% of the worldwide electricity production level. The Chernobyl Nuclear Disaster with its long-term medico-biological, ecological, economic and social consequences caused a situation close to an ecological catastrophe of a global level.

The analysis of experience in large-scale disaster management in many cases has shown, that the functioning public health, civil defense and military medical service systems have not responded to emergency situations promptly, failed to gather enough facilities and their activities on the spot have not been coordinated, which have resulted in negative outcome. The further development of nuclear power energy and allocation of nuclear power stations in densely populated areas require early planning, a complex system of medical and organizational measures, coordination of activities of various ministries and departments which manage nuclear power engineered enterprises as well as development and application of special measures for protection and care of maintenance staff and population to avoid or minimize the risk of their exposure.

In October 1986, after the Chernobyl Nuclear Disaster the Federal Center of Radiation Medicine of the Academy of Medical Sciences of the USSR was established (now the National Center of Radiation Medicine of the Ukrainian Academy of Medical Sciences) which included three institutes: the Epidemiology and Radiation Injury Prophylaxis Institute, the Clinical Radiology Institute (with a 300 bed clinic and an out-patients' clinic) and the Experimental Radiology Institute.

It should be noted, that the preservation of people's lives and health in emergency situations caused by natural disasters, accidents and catastrophes is a national task. To improve the system of measures for public health protection in radiation accident situations a search emergency medicine center "Zaschita" (Protection) was established in Moscow in 1990 under the aegis of the Biophysics Institute of the Ministry of Public Health of the USSR. On its base the All-Russian Emergency Medicine Center "Zaschita" was established in 1994. The Scientific Radiation Medicine Center became a base institution. In 1990 according to the Order of the Ministry of Public Health of the USSR the South-West Urgent Medical Care Center began to work as part of the Center.

In 1992, after Ukraine had become an independent country, the South-West Center was reorganized into a scientific department of urgent medical care in radiation accident situations, which operated jointly with the rapid response teams. This unit was attached to the Institute of Clinical Radiology. The teams were gathered according to voluntarism with obligatory life and health insurance provided for each member. In the so-called "quiet" period the team specialists took home duties. The South-West Center and the scientific department of urgent medical care during radiation accidents were independent research units of the Radiation Medicine Scientific Center and they pursued scientific research. Members of the staff of the Urgent Medical Care Department include:

Paper presented at the RTO HFM Specialists' Meeting on "The Impact of NATO/Multinational Military Missions on Health Care Management", held in Kiev, Ukraine, 4-6 September 2000, and published in RTO MP-068.

Department manager - 1

Senior researcher - 2

Researcher - 1

Junior researcher - 1

Laboratory assistant with higher education - 1

Engineer of the 1st Category - 2

Senior laboratory assistant - 2

Technician - 1

4 rapid response teams (not on the permanent staff) were organized to include:

Team-leader (a medical radiologist);

Physicist (specialized in dosimetry);

Radiation hygiene medical specialist;

Nurse;

Driver (specialized in dosimetry);

Depending on the nature and scale of a radiation accident other specialists may be engaged (a hematologist, an endocrinologist, a psychiatrist, a neuropathologist, a pediatrician, a laboratory physician and others). The tasks of the Rapid Response Teams were:

* Urgent qualified medical care in radiation accident situations on Ukrainian territory and in other countries.
* Detection of radiation pollution level and preliminary individual radiation doses.
* Triage to determine priorities for casualty admission into specialized treatment facilities.
* Organization of hygienic and anti-epidemic measures.
* Establishing effective communication with the Ministry Health of Ukraine and other organizations, (the WHO, the MAGATE, the National Center of Radiation Medicine (NCRM) of the Ukrainian Academy of Medical Sciences) to give information concerning the nature and scale of an accident and the number of casualties right from the spot.
* Providing coordination with respective institutions and services on the spot during disaster relief activities.

The key point is to provide interaction between the Urgent Medical Care Department of the National Center of Radiation Medicine (NCRM) of the Ukrainian Academy of Medical Sciences with other institutions and departments in large scale accident situations.

For the period of their cooperation the Urgent Medical Care Department and the Rapid Response Teams visited the following sites of accidents:

* Chernobyl (a fire in the cable subway of Power Unit1 at Chernobyl Nuclear Power Station on October 1, 1991)
* Chernobyl (a fire Power Unit11 at Chernobyl Nuclear Power Station on October 11, 1991)
* Dneprodzerzhinsk (a paintwork material factory on November 20, 1991)
* Zolotonosha (an unauthorized ionizing radiation source was detected in a private house in 1993)
* Chernobyl (an unauthorized gamma radiation source was detected in an apartment house in 1994).

During disaster relief activities at the forenamed sites the department and team specialists examined 482 patients, took 126 measurements of exposure doses. The examinations were made both on the spot and in the NCRM outpatient clinic and hospital. The department personnel has participated in 16 exercises and adequately represented the Ministry of Public Health in the "Partnership For Peace" NATO exercises. The department researchers have developed a package of documents including the following:

* A concept of specialized urgent medical care service in radiation accident situations in Ukraine.
* A structure of specialized urgent medical care service in radiation accident situations in Ukraine.
* A statute concerning specialized urgent medical care service in radiation accident situations, centers, branches, the urgent medical care department and the rapid response teams.
* Methodic recommendations "Urgent Medical Care in Radiation Accident Situations Organized and Provided by Rapid Response Teams" and "Urgent Medical Care Services in Radiation Accident Situations: Assessment of Their Preparedness".

They also participated in the development of the "Medical Support of Nuclear Power Industrial Enterprises" State Program. In 1998 the National Center of Radiation Medicine (NCRM) of the Ukrainian Academy of Medical Sciences was extended up to 560 beds. A marrow transplantation center and a rehabilitation center were opened. It should be noted that the National Center of Radiation Medicine (NCRM) of the Ukrainian Academy of Medical Sciences has now become a unique specialized scientific and medical institution capable of solving urgent problems concerning dosimetry, hygienic and medical monitoring of victims of local and large scale accident casualties.

We consider it an honor and an evidence of our prestige that the World Health Organization recognized our Center as the collaborative organization in 1998. The Center cooperates with the WHO on the problems of critical radiation situations and medical preparedness for radiation accidents (WHO Collaborating Center for Radiation Emergency Medical Preparedness And Assistance Network (REMPAN)).

In conclusion, I would like to say that previous experience makes possible not to repeat the same mistakes as well as optimize a complex of preventive and accident relief measures for minimizing possible damage. The further development of the urgent medical care service in radiation accident situations within united national disaster medicine service will minimize both the risk of an emergency at nuclear power stations and manpower and financial expenditures of public health authorities and institutions. The Chernobyl experience has shown, that early planning, proper organization and permanent preparedness of each branch of the urgent medical service in radiation accident situations will make its work well-coordinated and effective both in so called quiet periods and in emergency situations.

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14. Abstract

The proceedings include the Technical Evaluation Report, two key-note addresses and solicited papers of the Specialists' meeting sponsored by the NATO Human Factors and Medicine Panel and held at the "Ukrainsky Dim" in Kiev, Ukraine, 4-6 September 2000.

Recent major events across the world and at national levels have radically altered the global picture and have reshaped the NATO strategy from one aimed at resolving international conflict to one predominantly aimed at missions other than war (peacekeeping, humanitarian, disaster relief, etc.). Most of these missions are performed by multinational forces, which requires the cooperation of all military services including the medical support systems.

The new objectives require radical changes in the organizational structure, management, and supply of national and allied military health systems.

The purpose of this Specialists' Meeting was to exchange information and experience on Health Service Support (HSS) of multinational troops, to review the development of interoperable forms of multinational HSS in the field, to examine the lessons learned during actual operational deployment of multinational medical facilities, and to discuss the interplay between multinational, alliance/NGO, and civil/military operations in coping with disasters which require alliance or EAPC assistance.

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